FEM 1.209: 020021/1986

COMPLETED

# FLOOD INSURANCE STUDY

ORIGINAL

## MATANUSKA-SUSITNA BOROUGH, ALASKA

### MATANUSKA-SUSITNA DIVISION

JUNE 3, 1986

Federal Emergency Management Agency

COMMUNITY NUMBER - 020021

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Flood Boundary and Floodway Map

**PUBLISHED SEPARATELY:**

Flood Insurance Rate Map Index
Flood Insurance Rate Map

# FLOOD INSURANCE STUDY

## 1.0 INTRODUCTION

### 1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the unincorporated areas of Matanuska-Susitna Borough, Alaska, and within the incorporated Cities of Palmer, Houston, and Wasilla, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study will be used to convert Matanuska-Susitna Borough to the regular program of flood insurance by the Federal Emergency Management Agency. Local and regional planners will use this study in their efforts to promote sound flood plain management.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than those on which these federally supported studies are based. These criteria take precedence over the minimum Federal criteria for purposes of regulating development in the flood plain, as set forth in the Code of Federal Regulations at 44 CFR, 60.3. In such cases, however, it shall be understood that the State (or other jurisdictional agency) shall be able to explain these requirements and criteria.

### 1.2 Authority and Acknowledgments

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968, as amended.

The hydrologic and hydraulic analyses for this study were performed by the U.S. Army Corps of Engineers, Alaska District, for the Federal Emergency Management Agency, under Inter-Agency Agreement No. IAA-H-1878, Project Order No. 15. This work, which was completed in April 1982, covered all significant flooding sources affecting Matanuska-Susitna Borough.

A Type 19 Flood Insurance Study was also performed by the study contractor, under Inter-Agency Agreement No. EMW-E-1153, Project Order No. 1, Amendment No. 5. This work was completed in April 1985. It covers portions of Matanuska River and Knik River in the Bodenburg Butte area.

### 1.3 Coordination

A meeting was held on July 20, 1977, and attended by representatives of the study contractor, the Federal Emergency Management Agency, and Matanuska-Susitna Borough. The purpose of the meeting was to determine which streams would require detailed study and which would require approximate study. A priority list of the streams to be studied was determined; however, due to the lack of funds, the highest priority streams (Matanuska, Susitna, and Knik Rivers) were eliminated from this study. Instead, three streams which have already been partially studied by the U.S. Army Corps of Engineers were funded for this study. The other streams will be studied at a later date when funds are available. Coordination was made with the U.S. Geological Survey and the U.S. Soil Conservation Service. A draft of this study was reviewed by Matanuska-Susitna Borough.

Three final coordination meetings were held during the week of September 29, 1983. These meetings were attended by representatives of the Federal Emergency Management Agency, the study contractor, and the community. All problems and questions that were raised at the meeting have been resolved.

## 2.0 AREA STUDIED

### 2.1 Scope of Study

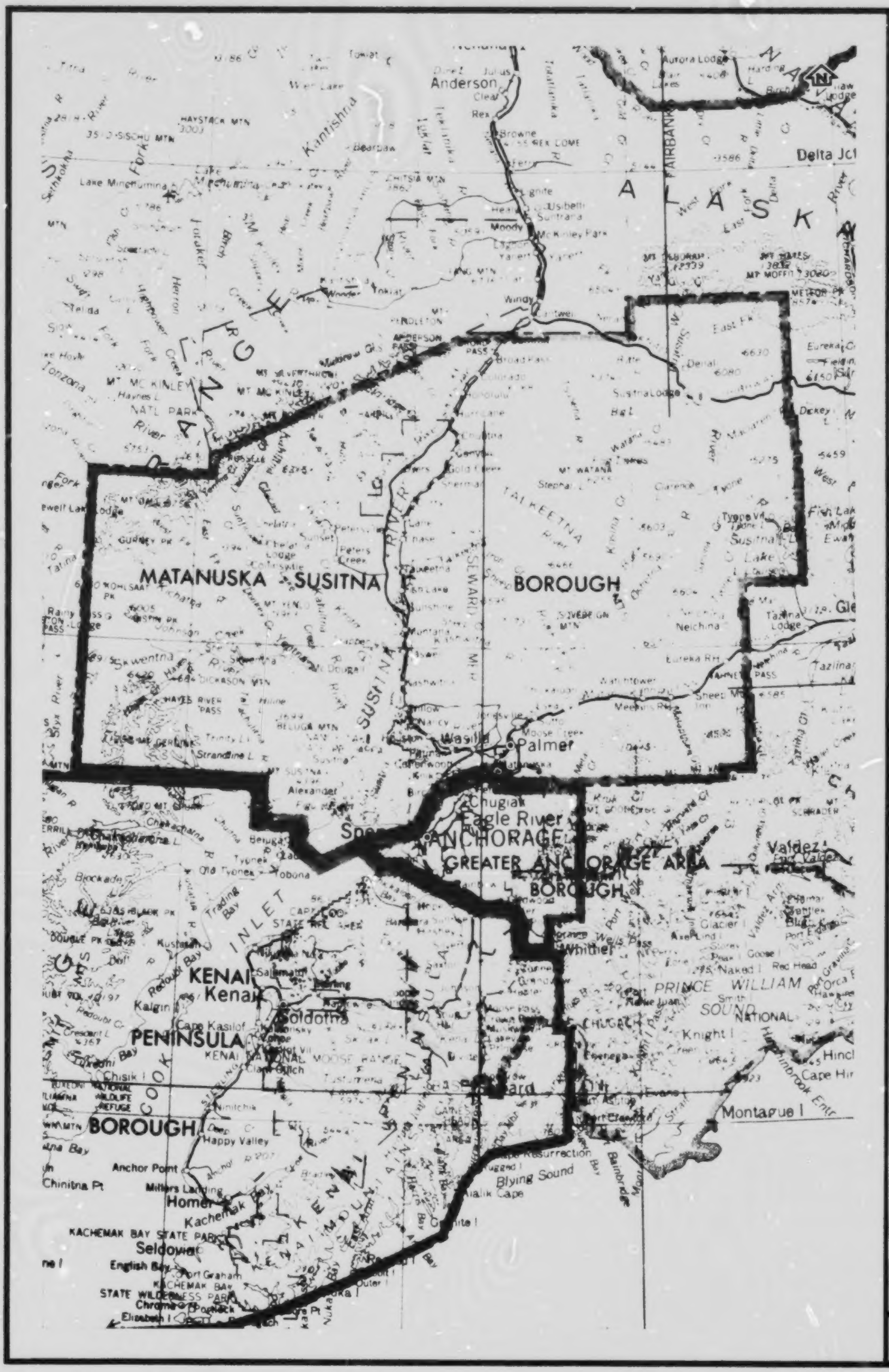
This Flood Insurance Study covers the incorporated Cities of Wasilla, Houston, and Palmer, and the unincorporated areas of Matanuska-Susitna Borough, Alaska. The area of study is shown on the Vicinity Map (Figure 1).

Deception Creek; Deception Creek Tributaries 1, 2, and 3; Willow Creek; Willow Creek Tributary; Little Susitna River; and Little Susitna River Split Flows 1, 2, and 3 were studied by detailed methods. Each stream was studied from a downstream location, below which little development is expected by the borough due to wetland conditions, to an upstream location where the 100-year flood plain is less than 200 feet wide.

Flooding in the Bodenburg Butte area along Matanuska River and Knik River was initially studied by approximate methods. Results from the Type 19 Flood Insurance Study were used to revise the approximate flood boundaries. The latter study evaluated flood hazards on Matanuska River in the vicinity of a flood protection dike along Old Glenn Highway, and on Knik River from Windsong and Heritage Park Subdivision development to Old Glenn Highway Bridge. Information generated by this study is not sufficient to define detail flood boundaries on these streams.

Those areas studied by detailed methods were chosen with consideration given to all proposed construction and forecasted development through 1987.

Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to and agreed upon by the Federal Emergency Management Agency and the borough.


ALASKA RANGE
ALASKA
MATANUSKA - SUSITNA BOROUGH
GREATER ANCHORAGE AREA BOROUGH
KENAI PENINSULA BOROUGH
ANCHORAGE
Palmer
Wasilla
Chugiak
Eagle River
Anderson
Delta Jct
Valdez
Whittier
Seward
Kenai
Soldotna
Homer
Seldovia
Talkeetna
MT. MC KINLEY NATL PARK
COOK INLET
PRINCE WILLIAM SOUND
TALKEETNA MTS
SUSITNA RIVER
Montague I
Blying Sound

APPROXIMATE SCALE

0 4 8 12 MILES

## VICINITY MAP

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

**FIGURE 1**

3

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## 2.2 Community Description

Matanuska-Susitna Borough, located in the Third Judicial District in south-central Alaska, governs an area of over 23,000 square miles extending from the Municipality of Anchorage in the south to Mt. McKinley National Park in the north. It is surrounded by unorganized area to the north, east, and west, and by Greater Anchorage Area and Kenai Peninsula Boroughs to the south. The population of Matanuska-Susitna Borough was 6,509 in 1970 and increased 174 percent to 17,816 by 1980 (Reference 1). It is estimated that over 2,000 people live near the streams studied by detailed methods.

Most of the land along Deception Creek, Willow Creek, and the Little Susitna River is developing as a low-residential area. The watershed basins for these streams are located in south-central Alaska, approximately 30 air miles and 70 miles by highway north of Anchorage. The area has been a focal point of increasing use for recreational activities such as boating, hiking, snowmobiling, fishing, and hunting. This increased recreational usage can be attributed to the area's esthetic qualities and closeness to Anchorage, the largest city in the State. Tremendous subdivision activities stressing recreational lots have been occurring in recent years.

The streams studied by detailed methods originate in the Talkeetna Mountains and flow west to the Susitna River or Cook Inlet. Physiographic characteristics are quite varied having developed from glacial activities and volcanic action. The study area is underlain primarily by bedrock consisting of weakly consolidated, coal-bearing rocks of Tertiary Age. It has been glaciated several times, so there are thick deposits of glacial drift and alluvial sediments made up of sandy and gravelly material. The relative proportions of the materials in the glacial drift vary quite a bit, as does the compactness of the soil. Thus, permeability and internal drainage are highly variable, even over short distances. Poorly drained soils often occur on the slopes of moraines in close association with well-drained soils. Most of the area is also covered with a mantle of silty loess probably derived from the Susitna River flood plains to the west. The loess ranges from a few inches to several feet in thickness. Poorly drained peat is common in scattered depressions, shallow basins between moraine hills, and other low-lying areas. The Willow area contains fifteen varying vegetative habitat types composed of mature stands of mixed coniferous and deciduous forests with an understory of a variety of forbs and woody plants, muskeg-black spruce bogs, and grassland areas. Ferns, horsetails, and clubmosses are present throughout the entire borough. Generally, the vegetative ground cover is dense and provides substantial protection from erosion activity, particularly in the higher elevations where better drained soil conditions are found. Willow and birch/aspen stands under 10 feet high are generally lacking, with low woody shrubs such as Vaccinum being very common throughout the borough. Elevations range from

10,000 feet in the mountains to less than 100 feet in the southern valleys.

The region is in a transitional climatic zone between maritime and continental conditions. Pronounced temperature variations and cloudy weather are common during a large portion of the year. Mountain ranges to the south act as a barrier to the influx of warm air from the Gulf of Alaska, resulting in an average annual precipitation which is only 10 to 15 percent of that at stations located on the Gulf of Alaska.

Annual precipitation in the study area averages 25 inches with annual snowfall of 80 inches. Rainfall is generally heaviest in August and September with monthly precipitation amounts approximately equal for the rest of the year. The Alaska Mountain range lies in a long arc, approximately 70 miles north of the detailed study area and serves as an effective barrier to the flow of extreme cold winter weather from the north. The streams remain frozen during the winter with ice jam flooding occurring occasionally in the spring. Annual temperatures range from -20°F to 80°F.

## 2.3 Principal Flood Problems

Floods in Matanuska-Susitna Borough can occur as a result of a combination of factors, including heavy snow pack, temperature, sunshine, and precipitation. The sequence of events affects the flooding potential. Spring floods on streams may occur as a result of an above-normal snowfall during the winter followed by an unusually cold spring and a rapid snowmelt. Summer and fall floods usually result from intense precipitation. In addition, an ice jam could occur during the winter or during spring breakup causing overbank flooding. Ice jams have caused the highest flooding on these streams, but no frequency has been applied to this type of flood. Typical of most of Alaska, there is little information available concerning historical floods in Matanuska-Susitna Borough. Public agencies and longtime residents, however, substantiate that floods have occurred. Information of historical floods was obtained primarily from interviews with residents in the area. A tabulation of floods in recent years and an analysis of conditions resulting from these floods are shown in Table 1. The principal flood problems are natural obstructions such as trees and vegetation along the banks, manmade obstructions such as bridges and boatdocks, ice jams, the accumulation of brush and debris along and within the streambed which can be carried downstream by high water and block bridge openings or other constrictions, and inadequately-sized culverts.

Willow Creek crosses the Parks Highway at mile 72. It originates in the Talkeetna Mountains and generally flows west to join the Susitna River. It has a total length of approximately 35 miles of which only the lower 18 is developable. The two major tributaries to this stream are Peters Creek and Deception Creek. The lower reaches of the stream, especially above the Parks Highway, are

## Table 1. Historical Flooding

| Year | Flooding Source and Resulting Damage |
|---|---|
| 1938 | Willow Creek; water overtopped the railroad, caused by ice jam. |
| 1943 | Little Susitna River; pier in railroad bridge washed out. |
| 1949 | Little Susitna River; rain on rapid snowmelt caused roads to wash out, damaged culvert. |
| 1955 | Willow Creek; heavy rainfall damaged railroad. |
| 1959 | Little Susitna River; massive road washouts at Houston and Little Susitna Inn, track and culverts washed out. |
| 1963 | Little Susitna River; roads washed out, damaged culverts. |
| 1964 | Little Susitna River; ice jam flooding. |
| 1964 | Willow Creek; ice jam flooding. |
| 1971 | Willow Creek; log jam caused flooding near Willow, damage to highways and residences. |
| 1971 | Little Susitna River; railroad undermined at Houston caused derailment of 13 cars. Man-made dam broke during rainfall. Lower Hatcher Pass Road bridge over the Little Susitna River washed out. |
| 1971 | Matanuska River; flooding resulted when a landslide-formed dam on Granite Creek (a tributary to the Matanuska River) broke during a period of rainfall and snowmelt. Water overtopped Old Palmer Highway in the Bodenburg Butte area, and residential and commercial buildings were flooded. Discharge was estimated at 80,000 cubic feet per second (cfs). Estimated 100-year discharge for the Matanuska River at Palmer is 40,000 cfs. |
| 1975 | Willow Creek; ice and log jams caused flooding. Approximately five homes were flooded off Hatcher Pass Road, 2 to 5 miles east of the Parks Highway. |

under intense pressure for subdivision and development in spite of the fact that there are obvious flood hazards within the area.

Deception Creek also originates in the Talkeetna Mountains and generally flows north and west for approximately 20 miles to join Willow Creek just upstream of the Parks Highway. At the present time, the entire length of Deception Creek is sparsely developed with very few crossings.

The Little Susitna River drains the southern slopes of the Talkeetna Mountains and has its headwaters in the mountains. The land form is such that the river intercepts numerous minor tributaries directly from the mountain slopes to the north. It is an extreme meandering stream and has a total length of approximately 75 miles.

### 2.4 Flood Protection Measures

A dike was constructed along Old Glenn Highway in Bodenburg Butte to prevent spring runoff of Matanuska River from overtopping the highway. The dike does not provide protection against the 100-year flood.

Matanuska-Susitna Borough recently passed a zoning ordinance to restrict development in areas noted for flood hazard. These areas have been determined by previous U.S. Army Corps of Engineers or U.S. Geological Survey studies.

## 3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the borough standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equalled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for flood plain management and for flood insurance premium rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equalled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual occurrence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported here reflect flooding potentials based on conditions existing in the borough at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

## 3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for each flooding source studied in detail affecting the borough.

Peak discharges for selected recurrence intervals on Deception Creek; Deception Creek Tributaries 1, 2, and 3; Willow Creek; and Willow Creek Tributary were determined utilizing Clarks time-area unit hydrograph analysis sub-routine in the computer program HEC-1 developed by the U.S. Army Corps of Engineers (Reference 2). Precipitation was determined from the U.S. Weather Bureau Technical Paper No. 53 (Reference 3) and used in the HEC-1 program. These frequencies were confirmed through a regional-frequency analysis developed for other gaged basins in the same geographic area.

Peak discharges for selected recurrence intervals on the Little Susitna River were determined utilizing a regional analysis of drainage area-peak discharge relationships for other stream-gaging stations within the geographic area of the Little Susitna River.

Peak discharge-drainage area relationships for streams studied by detailed methods are shown in Table 2.

The hydrologic analysis included a review of all existing flood frequency data for the area and the utilization of analytical techniques best suited to the specific stream data. Statistical analyses were conducted in accordance with approved procedures recommended by the U.S. Water Resources Council guidelines for determining flood flow frequency (Reference 4).

Reference 19 provides the 100-year peak discharges. It is based on frequency analysis of the data obtained at U.S. Geological Survey gaging station 15,248,000 on Matanuska River. Four recorded discharges resulting from Lake George breakout events (Reference 20) were used for the Knik River analysis.

## 3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the flooding sources studied in the borough were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each of these flooding sources.

Water-surface profiles were computed for Willow Creek, Deception Creek, and the Little Susitna River utilizing a computerized HEC-2 step-backwater program developed by the U.S. Army Corps of Engineers (Reference 5).

Cross sections were developed from survey notes, field reconnaissance, photographs, previous studies, and the use of topographic maps at a scale of 1:4,800 (References 6 and 7). Intermediate cross sections were developed utilizing cross-sectional area of

## Table 2. Summary of Discharges

| Flooding Source and Location | Drainage Area (Square Miles) | Peak Discharges (Cubic Feet per Second) 10-Year | 50-Year | 100-Year | 500-Year |
|---|---|---|---|---|---|
| Deception Creek | | | | | |
| At Mouth | 58 | 3,650 | 5,400 | 6,300 | 9,000 |
| Deception Creek Tributary 1 | | | | | |
| At Mouth | N/A | 1,110 | 1,620 | 1,840 | 2,450 |
| Deception Creek Tributary 2 | | | | | |
| At Mouth | N/A | 1,050 | 1,550 | 1,840 | 2,580 |
| Deception Creek Tributary 3 | | | | | |
| At Mouth | N/A | 690 | 1,030 | 1,200 | 1,720 |
| Willow Creek | | | | | |
| Downstream of Parks Highway | 256 | 9,800 | 14,600 | 16,900 | 24,200 |
| Willow Creek Tributary | | | | | |
| At Mouth | N/A | 2,800 | 4,600 | 5,900 | 9,200 |
| Little Susitna River | | | | | |
| Downstream of Alaska Railroad | 169 | 8,300 | 12,900 | 15,200 | 21,600 |
| At Schrock Road | 140 | 7,400 | 11,400 | 13,500 | 19,000 |
| Downstream of Welsh Road | 99 | 5,800 | 8,900 | 10,500 | 14,900 |

the stream in conjunction with the topographic maps. The cross sections were located at close intervals in the vicinity of structures to determine the backwater effects of these structures. In addition, numerous intermediate cross sections have been added when the slope of the stream or the total loss was excessive between any two cross sections. Except where noted in the computations, road and bridge failure was not considered in this study. In effect, the backwaters were computed so as to show the maximum flooding effect regardless of the structure being present.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway is computed (Section 4.2), selected cross section locations are also shown on the Flood Boundary and Floodway Map (Exhibit 2).

Channel roughness factors (Manning's "n") for these computations were assigned on the basis of field inspection of the flood plain areas and standard published factors for utilization of n values through pipes or culverts. The Manning's "n" values used are as follows:

|  | Roughness Factors | |
|---|---|---|
| Stream | Channel | Overbank |
| Deception Creek | | |
| Deception Creek Tributary 1 | | |
| Deception Creek Tributary 2 | | |
| Deception Creek Tributary 3 | | |
| Willow Creek | 0.030-0.035 | 0.035-0.075 |
| Willow Creek Tributary | 0.035 | 0.035-0.075 |
| Little Susitna River | 0.035 | 0.080-0.120 |
| Little Susitna River Split Flow 1 | 0.035 | 0.080 |
| Little Susitna River Split Flow 2 | 0.035 | 0.120 |
| Little Susitna River Split Flow 3 | 0.035 | 0.120 |

Starting water-surface elevations were based on utilization of the slope-area method.

During the early stages of examination of both Willow Creek and the Little Susitna River, it was determined there were several possibilities of divided flow, in essence, split flow throughout the stream reach. It was, therefore, necessary to split these areas, computing one side as a tributary and balancing the flows between the two. In some cases, as will be noted in the computations and on the work maps, floodways were necessary for both portions of this split flow condition.

The Little Susitna River has extensive flow divisions, and three extremely braided areas required split flow analysis. The secondary channels (braids) were modeled as tributaries with water surfaces balancing at the upstream division point.

Approximate 100-year flooding from the Matanuska River along Old Palmer Highway in the Bodenburg Butte area was studied using high-water marks from a flood which occurred in August 1971. High-water marks were determined from field surveys and interviews with local residents. No recurrence interval was assigned to this event.

Field-surveyed cross sections were used in the Type 19 analysis for Matanuska River and Knik River (Reference 21). Additional cross sectional data were obtained from the Alaska Department of Transportation and Public Facilities. HEC-2 analysis for Matanuska River utilized the levee option to evaluate the effect of the flood protection dike along Old Palmer Highway.

Flood profiles were drawn showing computed water-surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals (Exhibit 1).

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in the study are shown on the maps.

## 4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages State and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

### 4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the Federal Emergency Management Agency as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the boundaries of the 100- and 500-year floods have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:4,800, with a contour interval of 5 feet (References 6 and 7).

Approximate flood boundaries for flooding from the Matanuska River along Old Palmer Highway in the Bodenburg Butte area were initially determined using high-water marks from the 1971 event, and were revised using the Type 19 study results. Delineations were done on topographic maps at a scale of 1:2,400, with a contour interval of 2 feet (Reference 8).

Approximate flood boundaries on Susitna River, Kroto Creek, and Kroto Slough (in the vicinity of their confluences) were delineated based on information supplied by the community.

Approximate flood boundaries in some portions of the study area were taken from the Flood Hazard Boundary Map and from Flood Hazard Studies (References 9 through 16).

Flood boundaries for the 100- and 500-year floods are shown on the Flood Boundary and Floodway Map (Exhibit 2). In cases where the 100- and 500-year flood boundaries are close together, only the 100-year flood boundary has been shown. Small areas within the flood boundaries may lie above the flood elevations and, therefore, not be subject to flooding; owing to limitations of the map scale, such areas are not shown.

## 4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity, increases the flood heights of streams, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment in order that the 100-year flood may be carried without substantial increases in flood heights. Minimum standards of the Federal Emergency Management Agency limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this report are presented to local agencies as minimum standards that can be adopted or that can be used as a basis for additional studies.

These floodways were computed on the basis of equal conveyance reduction from each side of the flood plain. The results of these computations were tabulated at selected cross sections for each stream segment for which a floodway was computed (Table 3).

Weir flow can occur only to the north of the Alaska Railroad bridge, and a floodway must be left clear along the railroad embankment between Willow Creek and Willow Creek Tributary to permit flow from the main channel to the weir area.

On the Little Susitna River in two of the split flow areas, a split floodway was designed, and in some other areas the floodway is to follow the natural 100-year boundary. The latter was necessary because of excessive velocities and the large number of high ground areas. The extreme meandering nature of this stream required that

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER SURFACE ELEVATION | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| | | | | | (FEET NGVD) | | | |
| Deception Creek | | | | | | | | |
| A | 600 | 500 | 1,706 | 3.6 | 174.7 | 174.7 | 175.7 | 1.0 |
| B | 750 | 500 | 1,903 | 3.2 | 176.2 | 176.2 | 176.2 | 0.0 |
| C | 880 | 500 | 2,153 | 2.8 | 176.4 | 176.4 | 176.5 | 0.1 |
| D | 2,140 | 350 | 1,249 | 4.9 | 178.2 | 178.2 | 178.8 | 0.6 |
| E | 3,420 | 290 | 864 | 7.1 | 183.8 | 183.8 | 183.9 | 0.1 |
| F | 4,540 | 350 | 1,410 | 4.3 | 188.3 | 188.3 | 188.4 | 0.1 |
| G | 6,360 | 243 | 850 | 7.1 | 194.1 | 194.1 | 194.2 | 0.1 |
| H | 7,680 | 210 | 970 | 6.2 | 198.9 | 198.9 | 199.5 | 0.6 |
| I | 8,655 | 300 | 1,231 | 4.9 | 201.9 | 201.9 | 202.7 | 0.8 |
| J | 10,415 | 450 | 1,161 | 5.2 | 207.8 | 207.8 | 208.7 | 0.9 |
| K | 11,635 | 450 | 1,558 | 3.9 | 211.9 | 211.9 | 212.9 | 1.0 |
| L | 13,735 | 450 | 1,253 | 4.8 | 218.2 | 218.2 | 218.7 | 0.5 |
| M | 14,505 | 632 | 1,269 | 4.8 | 222.0 | 222.0 | 222.6 | 0.6 |
| N | 15,305 | 550 | 1,252 | 4.8 | 227.3 | 227.3 | 227.4 | 0.1 |
| O | 17,255 | 650 | 1,823 | 3.3 | 232.4 | 232.4 | 232.9 | 0.5 |
| P | 18,330 | 800 | 1,483 | 4.0 | 236.1 | 236.1 | 236.4 | 0.3 |
| Q | 16,620 | 800 | 1,580 | 2.6 | 237.6 | 237.6 | 238.0 | 0.4 |
| R | 19,705 | 400 | 686 | 4.3 | 240.9 | 240.9 | 240.9 | 0.0 |
| S | 20,985 | 400 | 1,557 | 3.2 | 244.1 | 244.1 | 244.4 | 0.3 |
| T | 22,285 | 500 | 1,085 | 3.7 | 246.6 | 246.6 | 246.9 | 0.3 |
| U | 23,400 | 285 | 666 | 5.3 | 251.2 | 251.2 | 251.2 | 0.0 |
| V | 24,765 | 250 | 1,018 | 2.7 | 253.1 | 253.1 | 253.8 | 0.7 |
| W | 26,130 | 52 | 155 | 8.8 | 257.9 | 257.9 | 258.2 | 0.3 |
| X | 27,180 | 439 | 721 | 3.9 | 263.3 | 263.3 | 263.7 | 0.4 |
| Y | 28,230 | 132 | 343 | 9.6 | 269.2 | 269.2 | 269.2 | 0.0 |
| Z | 29,730 | 500 | 1,019 | 4.7 | 276.7 | 276.7 | 277.3 | 0.6 |

[1] Feet Above Confluence With Willow Creek

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

## FLOODWAY DATA

DECEPTION CREEK

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER SURFACE ELEVATION | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY (FEET NGVD) | WITH FLOODWAY (FEET NGVD) | INCREASE |
| Deception Creek (Cont'd) | | | | | | | | |
| AA | 31,230 | 920 | 1,296 | 3.0 | 282.5 | 282.5 | 282.8 | 0.3 |
| AC | 32,950 | 379 | 726 | 4.8 | 288.3 | 288.3 | 288.6 | 0.3 |
| AD | 33,400 | 162 | 303 | 7.4 | 289.1 | 289.1 | 289.5 | 0.4 |
| AE | 34,930 | 544 | 772 | 2.9 | 296.4 | 296.4 | 296.4 | 0.0 |
| AF | 36,460 | 503 | 633 | 3.5 | 301.9 | 301.9 | 302.0 | 0.1 |
| AG | 37,185 | 579 | 1,272 | 3.2 | 306.0 | 306.0 | 306.8 | 0.8 |
| AH | 37,705 | 300 | 664 | 5.6 | 310.3 | 310.3 | 310.3 | 0.0 |
| AI | 38,340 | 500 | 1,271 | 2.9 | 312.3 | 312.3 | 312.6 | 0.3 |
| AK | 41,350 | 295 | 596 | 5.0 | 330.7 | 330.7 | 330.9 | 0.2 |
| AL | 43,160 | 331 | 574 | 5.2 | 346.1 | 346.1 | 346.1 | 0.0 |
| AM | 44,255 | 450 | 677 | 6.8 | 357.4 | 357.4 | 357.4 | 0.0 |
| AN | 45,235 | 324 | 658 | 6.4 | 369.9 | 369.9 | 370.4 | 0.5 |
| AO | 46,190 | 98 | 402 | 10.5 | 378.0 | 378.0 | 378.2 | 0.2 |
| AP | 47,400 | 400 | 753 | 5.6 | 391.3 | 391.3 | 391.8 | 0.5 |
| AQ | 48,525 | 184 | 473 | 9.0 | 406.8 | 406.8 | 406.8 | 0.0 |
| AR | 49,700 | 154 | 468 | 9.1 | 418.0 | 418.0 | 418.7 | 0.7 |
| AS | 50,750 | 144 | 414 | 10.3 | 431.2 | 431.2 | 431.2 | 0.0 |
| AT | 51,705 | 90 | 365 | 11.6 | 444.1 | 444.1 | 444.1 | 0.0 |
| AU | 52,470 | 259 | 656 | 6.5 | 452.2 | 452.2 | 452.3 | 0.1 |
| AV | 53,020 | 188 | 523 | 7.7 | 459.1 | 459.1 | 459.1 | 0.0 |
| AW | 53,410 | 188 | 521 | 7.7 | 464.5 | 464.5 | 464.5 | 0.0 |
| AX | 53,800 | 300 | 652 | 6.1 | 471.1 | 471.1 | 471.2 | 0.1 |
| AY | 54,620 | 300 | 660 | 6.1 | 479.6 | 479.6 | 479.9 | 0.3 |
| AZ | 55,530 | 300 | 680 | 5.8 | 485.7 | 485.7 | 485.7 | 0.0 |

[1] Feet Above Confluence With Willow Creek

| TABLE 3 | FEDERAL EMERGENCY MANAGEMENT AGENCY<br>MATANUSKA-SUSITNA BOROUGH, AK<br>(MATANUSKA-SUSITNA DIVISION) | FLOODWAY DATA<br>DECEPTION CREEK |
|---|---|---|

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER SURFACE ELEVATION | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| | | | | | (FEET NGVD) | | | |
| Deception Creek (Cont'd) | | | | | | | | |
| BA | 55,700[1] | 134 | 434 | 9.2 | 486.8 | 486.8 | 486.9 | 0.1 |
| BB | 56,675[1] | 490 | 864 | 4.6 | 501.9 | 501.9 | 502.6 | 0.7 |
| BC | 58,120[1] | 536 | 815 | 4.9 | 518.0 | 518.0 | 519.0 | 1.0 |
| BD | 59,410[1] | 142 | 445 | 8.9 | 533.9 | 533.9 | 533.9 | 0.0 |
| BE | 59,650[1] | 152 | 419 | 8.8 | 536.3 | 536.3 | 536.3 | 0.0 |
| BF | 59,920[1] | 97 | 350 | 10.5 | 539.6 | 539.6 | 539.7 | 0.1 |
| BG | 60,610[1] | 175 | 475 | 7.7 | 550.5 | 550.5 | 550.5 | 0.0 |
| BH | 61,385[1] | 267 | 623 | 5.9 | 556.7 | 556.7 | 557.1 | 0.4 |
| BI | 61,785[1] | 136 | 410 | 9.2 | 561.3 | 561.3 | 561.3 | 0.0 |
| BJ | 62,410[1] | 135 | 405 | 8.7 | 567.7 | 567.7 | 567.7 | 0.0 |
| Deception Creek Tributary 1 | | | | | | | | |
| A | 380[2] | 400 | 945 | 1.9 | 237.6 | 237.6 | 238.0 | 0.4 |
| B | 1,030[2] | 400 | 878 | 3.4 | 240.4 | 240.4 | 240.5 | 0.1 |
| C | 1,710[2] | 400 | 396 | 2.5 | 245.5 | 245.5 | 245.5 | 0.0 |
| D | 2,240[2] | 400 | 859 | 1.8 | 247.2 | 247.2 | 247.8 | 0.6 |
| E | 2,710[2] | 400 | 641 | 3.3 | 250.9 | 250.9 | 251.0 | 0.1 |
| F | 3,120[2] | 500 | 1,392 | 2.0 | 252.4 | 252.4 | 252.9 | 0.5 |
| G | 4,370[2] | 600 | 1,191 | 3.5 | 258.1 | 258.1 | 258.3 | 0.2 |
| H | 5,170[2] | 600 | 1,140 | 2.3 | 262.0 | 262.0 | 262.2 | 0.2 |
| I | 6,520[2] | 330 | 604 | 3.6 | 268.9 | 268.9 | 269.4 | 0.5 |
| J | 7,660[2] | 300 | 196 | 2.7 | 276.8 | 276.8 | 277.3 | 0.5 |
| K | 8,560[2] | 500 | 586 | 2.4 | 282.8 | 282.8 | 283.1 | 0.3 |

[1] Feet Above Confluence With Willow Creek [2] Feet Above Confluence With Deception Creek

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

**FLOODWAY DATA**

**DECEPTION CREEK-DECEPTION CREEK TRIBUTARY 1**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER SURFACE ELEVATION | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| | | | | | (FEET NGVD) | | | |
| Deception Creek Tributary 2 | | | | | | | | |
| A | 360 | 185 | 469 | 3.8 | 288.3 | 288.3 | 288.7 | 0.4 |
| B | 680 | 165 | 569 | 5.3 | 289.6 | 289.6 | 290.5 | 0.9 |
| C | 1,780 | 400 | 1,014 | 3.0 | 295.9 | 295.9 | 296.7 | 0.8 |
| D | 2,580 | 253 | 594 | 5.1 | 302.6 | 302.6 | 303.4 | 0.8 |
| E | 3,000 | 500 | 558 | 2.2 | 306.5 | 306.5 | 307.1 | 0.6 |
| F | 3,650 | 193 | 289 | 3.8 | 310.3 | 310.3 | 311.3 | 1.0 |
| G | 3,920 | 490 | 488 | 2.3 | 313.8 | 313.8 | 313.8 | 0.0 |
| H | 4,620 | 645 | 1,145 | 3.4 | 317.7 | 317.7 | 318.0 | 0.3 |
| I | 5,790 | 500 | 557 | 2.9 | 330.2 | 330.2 | 330.8 | 0.6 |
| J | 7,140 | 300 | 470 | 3.5 | 346.2 | 346.2 | 346.3 | 0.1 |
| Deception Creek Tributary 3 | | | | | | | | |
| A | 610 | 150 | 231 | 5.2 | 309.8 | 309.8 | 310.4 | 0.6 |
| B | 1,010 | 183 | 314 | 3.8 | 312.5 | 312.5 | 313.3 | 0.8 |
| C | 1,770 | 200 | 444 | 2.7 | 315.4 | 315.4 | 315.9 | 0.5 |
| D | 2,490 | 200 | 305 | 3.9 | 318.8 | 318.8 | 318.8 | 0.0 |

[1] Feet Above Confluence With Deception Creek

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

**MATANUSKA-SUSITNA BOROUGH, AK**
**(MATANUSKA-SUSITNA DIVISION)**

## FLOODWAY DATA

**DECEPTION CREEK TRIBUTARY 2-DECEPTION CREEK TRIBUTARY 3**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER SURFACE ELEVATION | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| | | | | | (FEET NGVD) | | | |
| Willow Creek | | | | | | | | |
| A | 0 | 1,600 | 5,438 | 3.1 | 107.5 | 107.5 | 108.5 | 1.0 |
| B | 810 | 949 | 2,335 | 7.2 | 109.6 | 109.6 | 109.9 | 0.3 |
| C | 3,200 | 1,505 | 5,509 | 3.1 | 115.4 | 115.4 | 116.0 | 0.6 |
| D | 4,710 | 1,600 | 5,357 | 3.2 | 116.9 | 116.9 | 117.6 | 0.7 |
| E | 6,870 | 650 | 2,732 | 6.2 | 119.8 | 119.8 | 120.7 | 0.9 |
| F | 8,870 | 1,500 | 6,993 | 2.4 | 123.4 | 123.4 | 124.4 | 1.0 |
| G | 12,230 | 1,700 | 5,514 | 3.1 | 130.3 | 130.3 | 130.7 | 0.4 |
| H | 17,780 | 1,600 | 5,831 | 2.9 | 139.5 | 139.5 | 140.5 | 1.0 |
| I | 20,000 | 1,600 | 4,315 | 3.9 | 144.5 | 144.5 | 145.4 | 0.9 |
| J | 22,655 | 1,920 | 4,831 | 3.5 | 151.5 | 151.5 | 152.0 | 0.5 |
| K | 22,785 | 2,000 | 11,745 | 1.4 | 155.4 | 155.4 | 155.4 | 0.0 |
| L | 23,100 | 2,100 | 11,077 | 1.5 | 155.5 | 155.5 | 155.5 | 0.0 |
| M | 24,590 | 675 | 2,163 | 4.6 | 156.7 | 156.7 | 156.8 | 0.1 |
| N | 27,215 | 85 | 738 | 13.6 | 163.3 | 163.3 | 164.2 | 0.9 |
| O | 27,320 | 1,649 | 5,355 | 2.7 | 167.5 | 167.5 | 168.0 | 0.5 |
| P | 33,170 | 400 | 1,950 | 5.9 | 182.6 | 182.6 | 183.3 | 0.7 |
| Q | 33,870 | 500 | 2,762 | 4.2 | 184.9 | 184.9 | 185.5 | 0.6 |
| R | 34,680 | 800 | 2,176 | 4.6 | 186.3 | 186.3 | 187.0 | 0.7 |
| S | 36,630 | 550 | 1,768 | 5.7 | 197.1 | 197.1 | 197.2 | 0.1 |
| T | 39,780 | 793 | 2,493 | 4.0 | 207.5 | 207.5 | 208.2 | 0.7 |
| U | 41,840 | 373 | 1,226 | 8.2 | 218.4 | 218.4 | 218.7 | 0.3 |
| V | 43,700 | 1,007 | 2,854 | 3.5 | 227.3 | 227.3 | 227.5 | 0.2 |
| W | 48,000 | 450 | 1,583 | 6.3 | 248.6 | 248.6 | 249.3 | 0.7 |
| X | 48,115 | 400 | 1,694 | 5.9 | 250.4 | 250.4 | 250.4 | 0.0 |
| Y | 50,220 | 800 | 1,820 | 5.5 | 261.2 | 261.2 | 261.2 | 0.0 |
| Z | 53,370 | 811 | 1,786 | 5.6 | 274.8 | 274.8 | 275.5 | 0.7 |

[1] Feet Above Downstream Limit of Detailed Study

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

**MATANUSKA-SUSITNA BOROUGH, AK**
**(MATANUSKA-SUSITNA DIVISION)**

## FLOODWAY DATA

**WILLOW CREEK**

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| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER SURFACE ELEVATION | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| | | | | | (FEET NGVD) | | | |
| Willow Creek (Cont'd) | | | | | | | | |
| AA | 56,250 | 180 | 818 | 12.2 | 301.5 | 301.5 | 301.5 | 0.0 |
| AB | 58,550 | 177 | 698 | 14.3 | 325.4 | 325.4 | 325.4 | 0.0 |
| AC | 59,070 | 159 | 1,073 | 14.8 | 331.5 | 331.5 | 331.5 | 0.0 |
| AD | 62,470 | 203 | 1,162 | 13.7 | 367.8 | 367.8 | 367.8 | 0.0 |
| AE | 66,110 | 163 | 1,085 | 14.7 | 407.8 | 407.8 | 407.8 | 0.0 |
| AF | 67,600 | 190 | 1,168 | 13.6 | 427.2 | 427.2 | 427.6 | 0.4 |
| AG | 68,430 | 132 | 1,006 | 15.8 | 439.1 | 439.1 | 439.1 | 0.0 |
| AH | 68,470 | 133 | 1,009 | 15.8 | 452.2 | 452.2 | 452.2 | 0.0 |

[1] Feet Above Downstream Limit of Detailed Study

**TABLE 3**

FEDERAL EMERGENCY MANAGEMENT AGENCY

**MATANUSKA-SUSITNA BOROUGH, AK**
**(MATANUSKA-SUSITNA DIVISION)**

**FLOODWAY DATA**

**WILLOW CREEK**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER SURFACE ELEVATION | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY (FEET NGVD) | WITH FLOODWAY (FEET NGVD) | INCREASE |
| Willow Creek Tributary | | | | | | | | |
| A | 1,185 | 1,450 | 3,961 | 1.7 | 155.7 | 155.7 | 156.4 | 0.7 |
| B | 2,665 | 1,250 | 5,535 | 1.2 | 160.0 | 160.0 | 160.1 | 0.1 |
| C | 2,725 | 931 | 1,704 | 4.0 | 164.0 | 164.0 | 164.0 | 0.0 |
| D | 9,700 | 517 | 833 | 3.0 | 181.2 | 181.2 | 181.4 | 0.2 |
| E | 10,920 | 500 | 1,313 | 1.9 | 185.3 | 185.3 | 185.4 | 0.1 |
| F | 12,355 | 450 | 1,102 | 4.7 | 192.7 | 192.7 | 192.7 | 0.0 |
| G | 14,205 | 600 | 2,219 | 2.3 | 198.0 | 198.0 | 198.2 | 0.2 |
| H | 15,650 | 600 | 1,255 | 4.1 | 204.4 | 204.4 | 204.5 | 0.1 |
| I | 17,940 | 450 | 1,439 | 3.6 | 212.8 | 212.8 | 213.3 | 0.5 |
| J | 21,400 | 650 | 1,751 | 3.0 | 224.5 | 224.5 | 225.4 | 0.9 |
| K | 23,500 | 870 | 1,780 | 2.9 | 231.7 | 231.7 | 231.8 | 0.1 |
| L | 26,740 | 1,197 | 2,010 | 2.6 | 246.5 | 246.5 | 246.8 | 0.3 |
| M | 28,540 | 800 | 1,548 | 3.3 | 254.4 | 254.4 | 254.8 | 0.4 |
| N | 29,130 | 650 | 1,244 | 4.2 | 259.6 | 259.6 | 259.8 | 0.2 |
| O | 30,280 | 500 | 1,061 | 4.9 | 269.5 | 269.5 | 269.5 | 0.0 |
| P | 31,110 | 250 | 933 | 5.6 | 273.7 | 273.7 | 273.7 | 0.0 |
| Q | 31,730 | 500 | 1,202 | 4.3 | 281.0 | 281.0 | 281.1 | 0.1 |
| R | 35,080 | 600 | 1,412 | 3.7 | 310.4 | 310.4 | 310.9 | 0.5 |
| S | 36,560 | 177 | 428 | 12.1 | 325.5 | 325.5 | 325.7 | 0.2 |

[1] Feet Above Confluence With Willow Creek

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

## FLOODWAY DATA

WILLOW CREEK TRIBUTARY

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER SURFACE ELEVATION | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| | | | | | (FEET NGVD) | | | |
| Little Susitna River | | | | | | | | |
| A | 0 | 1,650 | 7,738 | 2.0 | 230.5 | 230.5 | 231.0 | 0.5 |
| B | 1,520 | 2,400 | 7,729 | 2.0 | 232.4 | 232.4 | 232.8 | 0.4 |
| C | 6,070 | 2,140 | 7,995 | 1.9 | 236.7 | 236.7 | 237.4 | 0.7 |
| D | 10,760 | 300 | 3,012 | 5.1 | 241.6 | 241.6 | 242.1 | 0.5 |
| E | 10,880 | 290 | 4,912 | 3.1 | 245.3 | 245.3 | 245.5 | 0.2 |
| F | 15,060 | 1,360 | 8,506 | 1.8 | 247.0 | 247.0 | 247.3 | 0.3 |
| G | 18,380 | 350 | 3,991 | 3.8 | 248.5 | 248.5 | 248.9 | 0.4 |
| H | 18,720 | 500 | 4,169 | 3.7 | 249.2 | 249.2 | 249.5 | 0.3 |
| I | 21,915 | 1,060 | 6,067 | 2.5 | 251.3 | 251.3 | 251.6 | 0.3 |
| J | 26,400 | 1,235 | 8,622 | 1.8 | 253.3 | 253.3 | 254.3 | 1.0 |
| K | 27,730 | 1,305 | 7,118 | 2.1 | 254.5 | 254.5 | 255.3 | 0.8 |
| L | 29,830 | 1,350 | 7,030 | 2.2 | 256.5 | 256.5 | 257.2 | 0.7 |
| M | 32,580 | 1,050 | 6,006 | 2.5 | 258.7 | 258.7 | 259.3 | 0.6 |
| N | 35,790 | 1,500 | 9,803 | 1.6 | 260.5 | 260.5 | 261.5 | 1.0 |
| O | 38,000 | 1,200 | 7,791 | 2.0 | 262.1 | 262.1 | 263.0 | 0.9 |
| P | 41,140 | 1,180 | 7,225 | 2.1 | 264.8 | 264.8 | 265.4 | 0.6 |
| Q | 45,360 | 1,200 | 6,629 | 2.3 | 267.6 | 267.6 | 268.4 | 0.8 |
| R | 47,685 | 1,000 | 4,513 | 3.4 | 271.0 | 271.0 | 271.5 | 0.5 |
| S | 49,995 | 1,200 | 6,725 | 2.3 | 274.5 | 274.5 | 274.9 | 0.4 |
| T | 53,400 | 1,100 | 6,484 | 2.4 | 277.5 | 277.5 | 278.0 | 0.5 |
| U | 57,025 | 1,220 | 6,980 | 2.2 | 280.6 | 280.6 | 281.3 | 0.7 |
| V | 59,180 | 1,350 | 6,876 | 2.2 | 282.5 | 282.5 | 283.4 | 0.9 |
| W | 61,950 | 1,450 | 8,137 | 1.9 | 284.8 | 284.8 | 285.7 | 0.9 |
| X | 64,000 | 1,395 | 5,890 | 2.6 | 287.8 | 287.8 | 288.5 | 0.7 |
| Y | 67,090 | 1,100 | 4,836 | 3.2 | 293.5 | 293.5 | 294.0 | 0.5 |
| Z | 69,060 | 1,059 | 5,657 | 2.7 | 297.4 | 297.4 | 297.8 | 0.4 |

[1] Feet Above Downstream Limit of Detailed Study

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

**MATANUSKA-SUSITNA BOROUGH, AK**
**(MATANUSKA-SUSITNA DIVISION)**

## FLOODWAY DATA

**LITTLE SUSITNA RIVER**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER SURFACE ELEVATION | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| | | | | | | (FEET NGVD) | | |
| Little Susitna River (Cont'd) | | | | | | | | |
| AA | 70,780 | 1,060 | 6,329 | 2.2 | 299.8 | 299.8 | 300.1 | 0.3 |
| AB | 73,690 | 1,060 | 4,983 | 2.8 | 303.9 | 303.9 | 304.2 | 0.3 |
| AC | 75,510 | 1,250 | 7,734 | 1.8 | 305.9 | 305.9 | 306.6 | 0.7 |
| AD | 78,600 | 1,100 | 5,045 | 2.6 | 308.4 | 308.4 | 309.2 | 0.8 |
| AE | 80,050 | 1,200 | 6,740 | 2.0 | 310.4 | 310.4 | 311.0 | 0.6 |
| AF | 80,160 | 1,140 | 7,520 | 1.8 | 310.6 | 310.6 | 311.1 | 0.5 |
| AG | 81,183 | 875 | 2,864 | 4.6 | 312.0 | 312.0 | 312.3 | 0.3 |
| AH | 83,355 | 768 | 2,671 | 5.0 | 318.7 | 318.7 | 319.0 | 0.3 |
| AI | 86,615 | 1,337 | 6,510 | 2.0 | 324.0 | 324.0 | 324.8 | 0.8 |
| AJ | 88,840 | 1,200 | 4,666 | 2.9 | 326.7 | 326.7 | 327.5 | 0.8 |
| AK | 91,090 | 1,080 | 4,048 | 3.3 | 331.1 | 331.1 | 331.6 | 0.5 |
| AL | 94,910 | 1,150 | 5,574 | 2.2 | 336.4 | 336.4 | 336.8 | 0.4 |
| AM | 97,145 | 1,550 | 4,052 | 3.0 | 341.5 | 341.5 | 342.1 | 0.6 |
| AN | 99,555 | 1,445 | 7,106 | 1.7 | 345.6 | 345.6 | 346.2 | 0.6 |
| AO | 101,590 | 1,765 | 1,305 | 9.4 | 349.0 | 349.0 | 349.0 | 0.0 |
| AP | 103,145 | 2,454 | 1,837 | 6.7 | 355.3 | 355.3 | 355.3 | 0.0 |
| AQ | 103,340 | 3,309 | 9,264 | 1.3 | 357.4 | 357.4 | 357.4 | 0.0 |
| AR | 103,870 | 3,003 | 6,637 | 1.9 | 357.8 | 357.8 | 357.8 | 0.0 |
| AS | 104,610 | 2,598 | 4,329 | 2.8 | 360.9 | 360.9 | 360.9 | 0.0 |
| AT | 105,130 | 2,474 | 8,195 | 1.5 | 363.0 | 363.0 | 363.0 | 0.0 |
| AU | 105,835 | 2,482 | 7,813 | 1.6 | 363.7 | 363.7 | 363.7 | 0.0 |
| AV | 106,050 | 1,840 | 4,863 | 2.5 | 363.7 | 363.7 | 363.7 | 0.0 |
| AW | 107,440 | 1,060 | 2,728 | 4.5 | 368.0 | 368.0 | 368.0 | 0.0 |
| AX | 109,060 | 1,010 | 3,548 | 3.5 | 372.9 | 372.9 | 373.1 | 0.2 |
| AY | 110,055 | 1,020 | 2,113 | 5.8 | 376.4 | 376.4 | 376.8 | 0.4 |
| AZ | 111,985 | 630 | 2,518 | 4.9 | 380.0 | 380.0 | 380.9 | 0.9 |

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[1] Feet Above Downstream Limit of Detailed Study

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

**MATANUSKA-SUSITNA BOROUGH, AK**
**(MATANUSKA-SUSITNA DIVISION)**

## FLOODWAY DATA

**LITTLE SUSITNA RIVER**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER SURFACE ELEVATION | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| | | | | | | (FEET NGVD) | | |
| Little Susitna River (Cont'd) | | | | | | | | |
| BA | 113,200 | 745 | 2,243 | 5.5 | 382.8 | 382.8 | 382.9 | 0.1 |
| BB | 114,385 | 444 | 1,536 | 8.0 | 386.2 | 386.2 | 386.2 | 0.0 |
| BC | 116,365 | 990 | 4,405 | 2.8 | 391.7 | 391.7 | 392.2 | 0.5 |
| BD | 118,335 | 676 | 1,825 | 6.7 | 396.4 | 396.4 | 396.4 | 0.0 |
| BE | 120,085 | 1,949 | 4,048 | 2.8 | 401.2 | 401.2 | 401.4 | 0.2 |
| BF | 121,860 | 165 | 770 | 12.5 | 405.9 | 405.9 | 405.9 | 0.0 |
| BG | 123,240 | 660 | 1,984 | 4.8 | 412.9 | 412.9 | 412.9 | 0.0 |
| BH | 123,470 | 222 | 1,550 | 6.2 | 413.4 | 413.4 | 413.4 | 0.0 |
| BI | 124,055 | 109 | 772 | 12.4 | 413.7 | 413.7 | 413.7 | 0.0 |
| BJ | 124,520 | 1,732 | 3,967 | 2.8 | 418.2 | 418.2 | 418.2 | 0.0 |
| BK | 125,095 | 200 | 979 | 5.7 | 419.2 | 419.2 | 419.2 | 0.0 |
| BL | 125,620 | 91 | 697 | 8.0 | 420.2 | 420.2 | 420.2 | 0.0 |
| BM | 126,510 | 96 | 444 | 12.6 | 423.6 | 423.6 | 423.6 | 0.0 |
| BN | 127,190 | 100 | 535 | 10.4 | 429.0 | 429.0 | 420.0 | 0.0 |
| BO | 128,135 | 195 | 716 | 7.8 | 434.0 | 434.0 | 434.0 | 0.0 |
| BP | 129,035 | 160 | 1,021 | 5.5 | 437.1 | 437.1 | 437.2 | 0.1 |
| BQ | 130,495 | 120 | 550 | 10.1 | 440.1 | 440.1 | 440.2 | 0.1 |
| BR | 131,835 | 758 | 1,559 | 3.6 | 446.4 | 446.4 | 446.4 | 0.0 |
| BS | 132,060 | 840 | 2,424 | 2.3 | 447.2 | 447.2 | 447.2 | 0.0 |
| BT | 132,280 | 750 | 1,885 | 3.0 | 447.4 | 447.4 | 447.4 | 0.0 |
| BU | 133,260 | 449 | 1,603 | 3.5 | 449.0 | 449.0 | 449.0 | 0.0 |
| BV | 134,115 | 970 | 2,349 | 4.8 | 451.5 | 451.5 | 451.5 | 0.0 |
| BW | 135,645 | 720 | 2,315 | 4.5 | 457.7 | 457.7 | 458.0 | 0.3 |
| BX | 136,925 | 750 | 3,188 | 3.3 | 462.8 | 462.8 | 463.7 | 0.9 |
| BY | 138,315 | 1,025 | 3,337 | 3.1 | 468.2 | 468.2 | 469.2 | 1.0 |
| BZ | 139,685 | 1,135 | 3,378 | 3.1 | 475.0 | 475.0 | 475.5 | 0.5 |

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[1] Feet Above Downstream Limit of Detailed Study

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

**MATANUSKA-SUSITNA BOROUGH, AK**
**(MATANUSKA-SUSITNA DIVISION)**

**FLOODWAY DATA**

**LITTLE SUSITNA RIVER**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER SURFACE ELEVATION | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| | | | | | (FEET NGVD) | | | |
| Little Susitna River (Cont'd) | | | | | | | | |
| CA | 140,770 | 1,260 | 3,421 | 3.1 | 481.0 | 481.0 | 482.0 | 1.0 |
| CB | 141,815 | 980 | 3,164 | 3.3 | 486.7 | 486.7 | 487.6 | 0.9 |
| CC | 142,640 | 1,020 | 2,500 | 4.2 | 492.2 | 492.2 | 492.4 | 0.2 |
| CD | 143,505 | 820 | 2,424 | 4.3 | 496.2 | 496.2 | 496.8 | 0.6 |
| CE | 144,835 | 620 | 1,837 | 5.7 | 502.5 | 502.5 | 502.7 | 0.2 |
| CF | 146,170 | 365 | 1,478 | 7.1 | 509.8 | 509.8 | 510.0 | 0.2 |
| CG | 147,455 | 1,100 | 2,691 | 3.9 | 516.3 | 516.3 | 516.6 | 0.3 |
| CH | 148,590 | 495 | 2,241 | 4.7 | 519.7 | 519.7 | 520.6 | 0.9 |
| CI | 149,985 | 1,000 | 2,390 | 4.4 | 526.8 | 526.8 | 527.1 | 0.3 |
| CJ | 151,365 | 740 | 2,975 | 2.9 | 532.7 | 532.7 | 533.5 | 0.8 |
| CK | 151,815 | 171 | 451 | 9.5 | 535.7 | 535.7 | 535.7 | 0.0 |
| CL | 152,320 | 800 | 1,901 | 2.3 | 537.9 | 537.9 | 538.5 | 0.6 |
| CM | 152,450 | 691 | 1,684 | 2.6 | 541.3 | 541.3 | 541.7 | 0.4 |
| CN | 154,110 | 700 | 1,843 | 2.3 | 547.3 | 547.3 | 548.2 | 0.9 |
| CO | 155,405 | 350 | 768 | 5.6 | 554.3 | 554.3 | 554.5 | 0.2 |
| CP | 156,755 | 239 | 615 | 7.0 | 560.9 | 560.9 | 560.9 | 0.0 |
| CQ | 157,620 | 200 | 416 | 10.3 | 563.2 | 563.2 | 563.2 | 0.0 |
| CR | 158,070 | 250 | 475 | 9.1 | 570.8 | 570.8 | 570.8 | 0.0 |
| CS | 158,955 | 115 | 452 | 9.5 | 576.6 | 576.6 | 576.6 | 0.0 |
| CT | 159,665 | 200 | 391 | 11.0 | 583.3 | 583.3 | 583.3 | 0.0 |
| CU | 160,530 | 2,008 | 1,395 | 3.1 | 587.4 | 587.4 | 587.4 | 0.0 |
| CV | 161,430 | 2,000 | 1,898 | 2.3 | 595.5 | 595.5 | 595.5 | 0.0 |
| CW | 162,125 | 2,280 | 4,516 | 1.9 | 597.7 | 597.7 | 597.7 | 0.0 |
| CX | 162,980 | 800 | 2,160 | 4.0 | 602.6 | 602.6 | 602.6 | 0.0 |
| CY | 163,845 | 1,500 | 1,846 | 4.7 | 609.3 | 609.3 | 609.3 | 0.0 |
| CZ | 164,715 | 2,400 | 4,455 | 1.9 | 617.1 | 617.1 | 617.1 | 0.0 |

[1] Feet Above Downstream Limit of Detailed Study

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

**MATANUSKA-SUSITNA BOROUGH, AK**
**(MATANUSKA-SUSITNA DIVISION)**

**FLOODWAY DATA**

**LITTLE SUSITNA RIVER**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER SURFACE ELEVATION | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| | | | | | (FEET NGVD) | | | |
| Little Susitna River (Cont'd) | | | | | | | | |
| DA | 165,610 | 1,000 | 3,151 | 2.7 | 622.0 | 622.0 | 622.0 | 0.0 |
| DB | 166,405 | 1,040 | 3,265 | 2.6 | 626.9 | 626.9 | 626.9 | 0.0 |
| DC | 167,230 | 2,640 | 4,232 | 2.0 | 632.0 | 632.0 | 632.0 | 0.0 |
| DD | 168,070 | 1,520 | 4,215 | 2.0 | 636.1 | 636.1 | 636.1 | 0.0 |
| DE | 168,905 | 1,600 | 2,176 | 3.5 | 644.8 | 644.8 | 644.8 | 0.0 |
| DF | 169,565 | 1,800 | 5,267 | 1.5 | 647.8 | 647.8 | 647.8 | 0.0 |
| DG | 170,245 | 800 | 2,607 | 3.0 | 651.9 | 651.9 | 651.9 | 0.0 |
| DH | 171,115 | 450 | 1,557 | 4.9 | 657.7 | 657.7 | 657.7 | 0.0 |
| DI | 171,980 | 620 | 2,250 | 3.4 | 666.0 | 666.0 | 666.0 | 0.0 |
| DJ | 172,300 | 500 | 1,638 | 4.7 | 670.5 | 670.5 | 670.5 | 0.0 |
| DK | 172,600 | 550 | 1,475 | 5.2 | 674.1 | 674.1 | 674.1 | 0.0 |
| DL | 173,225 | 1,250 | 2,159 | 3.6 | 681.0 | 681.0 | 681.0 | 0.0 |
| DM | 173,870 | 1,600 | 2,401 | 3.2 | 687.2 | 687.2 | 687.2 | 0.0 |
| DN | 174,210 | 1,880 | 3,147 | 2.4 | 691.7 | 691.7 | 691.7 | 0.0 |
| DO | 174,565 | 1,250 | 2,774 | 2.8 | 695.9 | 695.9 | 695.9 | 0.0 |
| DP | 174,950 | 1,300 | 2,828 | 2.7 | 699.6 | 699.6 | 699.6 | 0.0 |
| DQ | 175,250 | 1,000 | 2,318 | 3.3 | 703.9 | 703.9 | 703.9 | 0.0 |
| DR | 175,815 | 850 | 2,703 | 2.8 | 710.1 | 710.1 | 710.1 | 0.0 |
| DS | 176,400 | 600 | 1,556 | 4.9 | 718.5 | 718.5 | 718.5 | 0.0 |
| DT | 176,970 | 700 | 1,720 | 4.5 | 726.3 | 726.3 | 726.3 | 0.0 |
| DU | 177,770 | 906 | 2,143 | 3.6 | 734.3 | 734.3 | 734.3 | 0.0 |
| DV | 178,015 | 708 | 1,947 | 4.0 | 736.5 | 736.5 | 736.5 | 0.0 |
| DW | 178,265 | 294 | 720 | 10.7 | 746.7 | 746.7 | 746.7 | 0.0 |
| DX | 178,695 | 294 | 720 | 10.7 | 746.7 | 746.7 | 746.7 | 0.0 |
| DY | 179,125 | 328 | 837 | 9.2 | 752.9 | 752.9 | 752.9 | 0.0 |
| DZ | 179,470 | 187 | 694 | 11.1 | 758.7 | 758.7 | 758.7 | 0.0 |

[1] Feet Above Downstream Limit of Detailed Study

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

**MATANUSKA-SUSITNA BOROUGH, AK**
**(MATANUSKA-SUSITNA DIVISION)**

**FLOODWAY DATA**

**LITTLE SUSITNA RIVER**

| FLOODING SOURCE |  | FLOODWAY |  |  | BASE FLOOD WATER SURFACE ELEVATION |  |  |  |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|  |  |  |  |  | (FEET NGVD) |  |  |  |
| Little Susitna River Split Flow 1 |  |  |  |  |  |  |  |  |
| A | 200 | 3,309 | 9,264 | 1.3 | 357.4 | 357.4 | 357.4 | 0.0 |
| B | 600 | 3,003 | 6,637 | 1.9 | 357.8 | 357.8 | 357.8 | 0.0 |
| C | 1,150 | 2,598 | 4,329 | 2.8 | 360.9 | 360.9 | 360.9 | 0.0 |
| D | 1,550 | 2,474 | 8,195 | 1.5 | 363.0 | 363.0 | 363.0 | 0.0 |
| E | 1,800 | 2,482 | 7,813 | 1.6 | 363.7 | 363.7 | 363.7 | 0.0 |
| Little Susitna River Split Flow 2 |  |  |  |  |  |  |  |  |
| A | 120 | 1,949 | 4,048 | 2.8 | 401.2 | 401.2 | 401.4 | 0.2 |
| B | 2,220 | 1,164 | 1,459 | 1.2 | 407.2 | 407.2 | 407.2 | 0.0 |
| C | 3,420 | 515 | 1,026 | 1.7 | 414.0 | 414.0 | 414.0 | 0.0 |
| D | 3,880 | 773 | 1,321 | 1.3 | 417.4 | 417.4 | 417.4 | 0.0 |
| E | 4,070 | 816 | 3,955 | 2.9 | 418.1 | 418.1 | 418.1 | 0.0 |
| F | 4,530 | 1,731 | 3,955 | 2.9 | 418.1 | 418.1 | 418.1 | 0.0 |
| G | 5,720 | 450 | 2,151 | 2.7 | 420.2 | 420.2 | 420.3 | 0.1 |
| H | 7,025 | 300 | 1,462 | 3.9 | 423.4 | 423.4 | 424.4 | 1.0 |
| I | 8,650 | 620 | 2,190 | 2.6 | 427.8 | 427.8 | 428.8 | 1.0 |
| J | 9,780 | 600 | 1,795 | 3.2 | 432.1 | 432.1 | 432.5 | 0.4 |
| K | 10,560 | 500 | 1,119 | 5.1 | 436.4 | 436.4 | 436.6 | 0.2 |
| L | 11,110 | 600 | 2,174 | 2.6 | 438.4 | 438.4 | 438.9 | 0.5 |
| M | 11,995 | 800 | 1,995 | 2.9 | 442.7 | 442.7 | 442.7 | 0.0 |
| N | 12,490 | 1,125 | 5,232 | 1.1 | 444.5 | 444.5 | 442.7 | 0.0 |
| O | 12,620 | 1,194 | 2,405 | 2.4 | 447.0 | 447.0 | 447.0 | 0.0 |
| P | 13,475 | 820 | 2,837 | 2.0 | 448.5 | 448.5 | 448.5 | 0.0 |
| Q | 13,715 | 670 | 1,333 | 4.3 | 448.9 | 448.9 | 448.9 | 0.0 |

[1] Feet Above Confluence With Little Susitna River

| TABLE 3 | FEDERAL EMERGENCY MANAGEMENT AGENCY<br>**MATANUSKA-SUSITNA BOROUGH, AK**<br>**(MATANUSKA-SUSITNA DIVISION)** | **FLOODWAY DATA**<br>**LITTLE SUSITNA RIVER–SPLIT FLOW 1-LITTLE SUSITNA RIVER–SPLIT FLOW 2** |
|---|---|---|

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER SURFACE ELEVATION | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| | | | | | | (FEET NGVD) | | |
| Little Susitna River Split Flow 3 | | | | | | | | |
| A | 450 | 620 | 1,048 | 4.1 | 535.6 | 535.6 | 536.3 | 0.7 |
| B | 1,265 | 330 | 1,131 | 3.8 | 540.5 | 540.5 | 540.7 | 0.2 |
| C | 1,380 | 340 | 811 | 5.3 | 542.4 | 542.4 | 542.5 | 0.1 |
| D | 2,940 | 480 | 1,548 | 2.8 | 548.4 | 548.4 | 549.0 | 0.6 |
| E | 4,240 | 425 | 1,177 | 3.7 | 555.7 | 555.7 | 555.7 | 0.0 |
| F | 5,775 | 630 | 1,593 | 2.7 | 566.5 | 566.5 | 567.3 | 0.8 |
| G | 6,515 | 816 | 1,747 | 2.5 | 570.6 | 570.6 | 570.6 | 0.0 |
| H | 7,285 | 1,020 | 1,680 | 2.6 | 576.5 | 576.5 | 576.5 | 0.0 |
| I | 7,960 | 680 | 926 | 4.6 | 580.7 | 580.7 | 580.7 | 0.0 |
| J | 8,610 | 740 | 1,184 | 3.6 | 586.9 | 586.9 | 586.9 | 0.0 |
| K | 9,240 | 491 | 1,294 | 3.3 | 589.6 | 589.6 | 589.6 | 0.0 |
| L | 9,880 | 950 | 1,346 | 3.2 | 593.9 | 593.9 | 593.9 | 0.0 |

[1] Feet Above Confluence With Little Susitna River

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

**MATANUSKA-SUSITNA BOROUGH, AK**
**(MATANUSKA-SUSITNA DIVISION)**

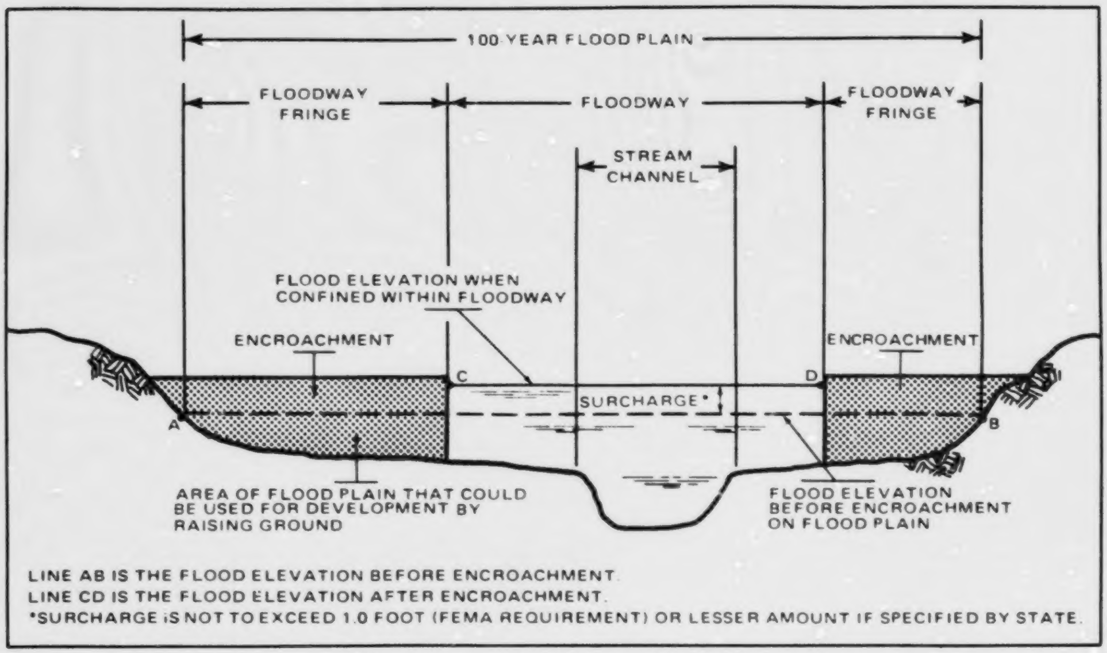
## FLOODWAY DATA

**LITTLE SUSITNA RIVER SPLIT FLOW 3**

the floodways go from meander to meander rather than attempt to follow the stream.

As shown on the Flood Boundary and Floodway Map (Exhibit 2), the floodway widths were determined at cross sections; between cross sections, the boundaries were interpolated. In cases where the boundaries of the floodway and the 100-year flood are either close together or collinear, only the floodway boundary has been shown.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 2.


100 YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN

LINE AB IS THE FLOOD ELEVATION BEFORE ENCROACHMENT.
LINE CD IS THE FLOOD ELEVATION AFTER ENCROACHMENT.
*SURCHARGE IS NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

Figure 2. Floodway Schematic

## 5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the Federal Emergency Management Agency has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors, and flood insurance zone designations for each flooding source studied in detail affecting Matanuska-Susitna Borough.

## 5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach:

| Average Difference Between 10- and 100-Year Floods | Variation |
|---|---|
| Less than 2 feet | 0.5 foot |
| 2 to 7 feet | 1.0 foot |
| 7.1 to 12 feet | 2.0 feet |
| More than 12 feet | 3.0 feet |

The locations of the reaches determined for the flooding sources of Matanuska-Susitna Borough are shown on the Flood Profiles (Exhibit 1) and summarized in Table 4.

## 5.2 Flood Hazard Factors

The Flood Hazard Factor (FHF) is the Federal Emergency Management Agency device used to correlate flood information with insurance rate tables. Correlations between property damage from floods and their FHF are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest one-half foot, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year water-surface elevations is greater than 10.0 feet, accuracy for the FHF is to the nearest foot.

## 5.3 Flood Insurance Zones

After the determination of reaches and their respective FHFs, the entire unincorporated area of Matanuska-Susitna Borough was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

| | |
|---|---|
| Zone A: | Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations shown or FHFs determined. |

| FLOODING SOURCE | PANEL[1] | ELEVATION DIFFERENCE[2] BETWEEN 1% (100-YEAR) FLOOD AND | | | FLOOD HAZARD FACTOR | ZONE | BASE FLOOD ELEVATION (FEET NGVD)[3] |
|---|---|---|---|---|---|---|---|
| | | 10% (10-YEAR) | 2% (50-YEAR) | 0.2% (500-YEAR) | | | |
| Deception Creek | | | | | | | |
| Reach 1 | 7945 | -1.0 | -0.2 | 0.9 | 010 | A2 | Varies - See Map |
| Reach 2 | 7945,7965 | -0.7 | -0.2 | 0.5 | 005 | A1 | Varies - See Map |
| Reach 3 | 7965,8780 | -1.1 | -0.3 | 0.7 | 010 | A2 | Varies - See Map |
| Reach 4 | 8780,8785 | -0.5 | -0.2 | 0.4 | 005 | A1 | Varies - See Map |
| Reach 5 | 8780,8785 | -1.7 | -0.4 | 1.0 | 015 | A3 | Varies - See Map |
| Reach 6 | 8785 | -0.9 | -0.2 | 0.6 | 010 | A2 | Varies - See Map |
| Reach 7 | 8785 | -1.5 | -0.3 | 0.9 | 015 | A3 | Varies - See Map |
| Deception Creek Tributary 1 | | | | | | | |
| Reach 1 | 7965 | -0.5 | -0.1 | 0.3 | 005 | A1 | Varies - See Map |
| Reach 2 | 7965,8780 | -1.1 | -0.3 | 0.7 | 010 | A2 | Varies - See Map |
| Deception Creek Tributary 2 | | | | | | | |
| Reach 1 | 8780 | -1.1 | -0.3 | 0.7 | 010 | A2 | Varies - See Map |
| Reach 2 | 8780 | -0.4 | -0.1 | 0.3 | 005 | A1 | Varies - See Map |
| Deception Creek Tributary 3 | | | | | | | |
| Reach 1 | 8780,8785 | -0.4 | -0.1 | 0.3 | 005 | A1 | Varies - See Map |
| Willow Creek | | | | | | | |
| Reach 1 | 7940,7945 | -1.07 | -0.29 | 0.78 | 010 | A2 | Varies - See Map |
| Reach 2 | 7945 | -1.71 | -0.73 | 1.00 | 015 | A3 | Varies - See Map |
| Reach 3 | 7965 | -1.10 | -0.16 | 0.62 | 010 | A2 | Varies - See Map |
| Reach 4 | 7965,7970 | -2.19 | -0.47 | 1.29 | 020 | A4 | Varies - See Map |

[1] Flood Insurance Rate Map Panel [2] Weighted Average [3] Rounded to Nearest Foot

**TABLE 4**

FEDERAL EMERGENCY MANAGEMENT AGENCY

**MATANUSKA-SUSITNA BOROUGH, AK**
**(MATANUSKA-SUSITNA DIVISION)**

## FLOOD INSURANCE ZONE DATA

**DECEPTION CREEK-DECEPTION CREEK TRIBUTARY 1-**
**DECEPTION CREEK TRIBUTARY 2-DECEPTION CREEK TRIBUTARY 3-WILLOW CREEK**

| FLOODING SOURCE | PANEL[1] | ELEVATION DIFFERENCE[2] BETWEEN 1% (100-YEAR) FLOOD AND | | | FLOOD HAZARD FACTOR | ZONE | BASE FLOOD ELEVATION[3] (FEET NGVD) |
|---|---|---|---|---|---|---|---|
| | | 10% (10-YEAR) | 2% (50-YEAR) | 0.2% (500-YEAR) | | | |
| Willow Creek Tributary | | | | | | | |
| Reach 1 | 7945 | -1.71 | -0.73 | 1.00 | 015 | A3 | Varies - See Map |
| Reach 2 | 7945 | -1.10 | -0.16 | 0.62 | 010 | A2 | Varies - See Map |
| Reach 3 | 7965 | -2.19 | -0.47 | 1.29 | 020 | A4 | Varies - See Map |

[1] Flood Insurance Rate Map Panel [2] Weighted Average [3] Rounded to Nearest Foot

**TABLE 4**

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

## FLOOD INSURANCE ZONE DATA

## WILLOW CREEK TRIBUTARY

| FLOODING SOURCE | PANEL[1] | ELEVATION DIFFERENCE[2] BETWEEN 1% (100-YEAR) FLOOD AND |  |  | FLOOD HAZARD FACTOR | ZONE | BASE FLOOD ELEVATION (FEET NGVD)[3] |
|---|---|---|---|---|---|---|---|
|  |  | 10% (10-YEAR) | 2% (50-YEAR) | 0.2% (500-YEAR) |  |  |  |
| Little Susitna River |  |  |  |  |  |  |  |
| Reach 1 | 8795,9610,<br>9630 | -1.46 | -0.47 | 0.92 | 015 | A3 | Varies - See Map |
| Reach 2 | 8795,8815,<br>9610,9630 |  |  |  | 035 | A7 | Varies - See Map |
| Reach 3 | 8815,8820<br>8840,8845,<br>8865,9630 | -1.84 | -0.51 | 1.23 | 020 | A4 | Varies - See Map |
| Reach 4 | 8865 | -1.21 | -0.37 | 0.88 | 010 | A2 | Varies - See Map |
| Reach 5 | 8865 | -2.21 | -0.35 | 0.91 | 020 | A4 | Varies - See Map |
| Reach 6 | 8865,8870 | -1.50 | -0.36 | 0.72 | 015 | A3 | Varies - See Map |
| Reach 7 | 8870 | -2.65 | -0.56 | 0.95 | 025 | A5 | Varies - See Map |
| Reach 8 | 8880,8890,<br>8860,8870 | -1.14 | -0.37 | 0.76 | 010 | A2 | Varies - See Map |
| Little Susitna River - Split Flow 1 |  |  |  |  |  |  |  |
| Reach 1 | 8845 | -1.99 | -0.31 | 0.90 | 020 | A4 | Varies - See Map |
| Little Susitna River - Split Flow 2 |  |  |  |  |  |  |  |
| Reach 1 | 8845,8865 | -2.12 | -0.60 | 1.10 | 020 | A4 | Varies - See Map |
| Little Susitna River - Split Flow 3 |  |  |  |  |  |  |  |
| Reach 1 | 8865,8870 | -1.50 | -0.36 | 0.72 | 015 | A3 | Varies - See Map |
| Reach 2 | 8870 | -2.65 | -0.56 | 0.95 | 025 | A5 | Varies - See Map |
| Reach 3 | 8870 | -0.85 | -0.32 | 0.91 | 010 | A2 | Varies - See Map |

[1] Flood Insurance Rate Map Panel [2] Weighted Average [3] Rounded to Nearest Foot

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

**MATANUSKA-SUSITNA BOROUGH, AK**
**(MATANUSKA-SUSITNA DIVISION)**

## FLOOD INSURANCE ZONE DATA

**LITTLE SUSITNA RIVER-LITTLE SUSITNA RIVER–SPLIT FLOW 1-**
**LITTLE SUSITNA RIVER–SPLIT FLOW 2-LITTLE SUSITNA RIVER–SPLIT FLOW 3**

Zones A1 through A5 and A7: Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations shown, and zones subdivided according to FHFs.

Zone B: Areas between the Special Flood Hazard Areas and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water-control structure; also areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.

Zone C: Areas of minimal flooding.

Zone D: Areas of undetermined, but possible flood hazard.

The flood elevation differences, FHFs, flood insurance zones, and base flood elevations for each flooding source studied in detail in the community are summarized in Table 4.

### 5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for Matanuska-Susitna Borough is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by the Federal Emergency Management Agency.

## 6.0 OTHER STUDIES

The U.S. Soil Conservation Service has prepared three Flood Hazard Studies, two Flood Plain Management Studies and a Flood Plain Inventory Report for various streams in Matanuska-Susitna Borough (References 11 through 16). These reports were the sources of some of the approximate flood boundaries presented in this study.

The Expanded Flood Plain Information Study for Willow, Alaska (Reference 17) utilized the same hydrologic and hydraulic procedures; however, through the use of spatial analysis, it reported the effects of flooding and development on the environment and considered the effects of evacuation, floodproofing, and zoning on existing conditions in the year 2000. This study is in agreement with the Flood Plain Information Study.

A Flood Insurance Study has been prepared for the Municipality of Anchorage (Reference 18). This study is in agreement with the Anchorage Flood Insurance Study. Flood Hazard Boundary Maps have been prepared for the unincorporated areas of Matanuska-Susitna Borough and the City of Palmer (References 9 and 10). Due to the more detailed nature of this study, it supersedes the Flood Hazard Boundary Maps.

This study is authoritative for the purposes of the National Flood Insurance Program; data presented herein either supersede or are compatible with all previous determinations.

## 7.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, Federal Emergency Management Agency, 130 228th Street SW., Bothell, Washington 98011.

## 8.0 BIBLIOGRAPHY AND REFERENCES

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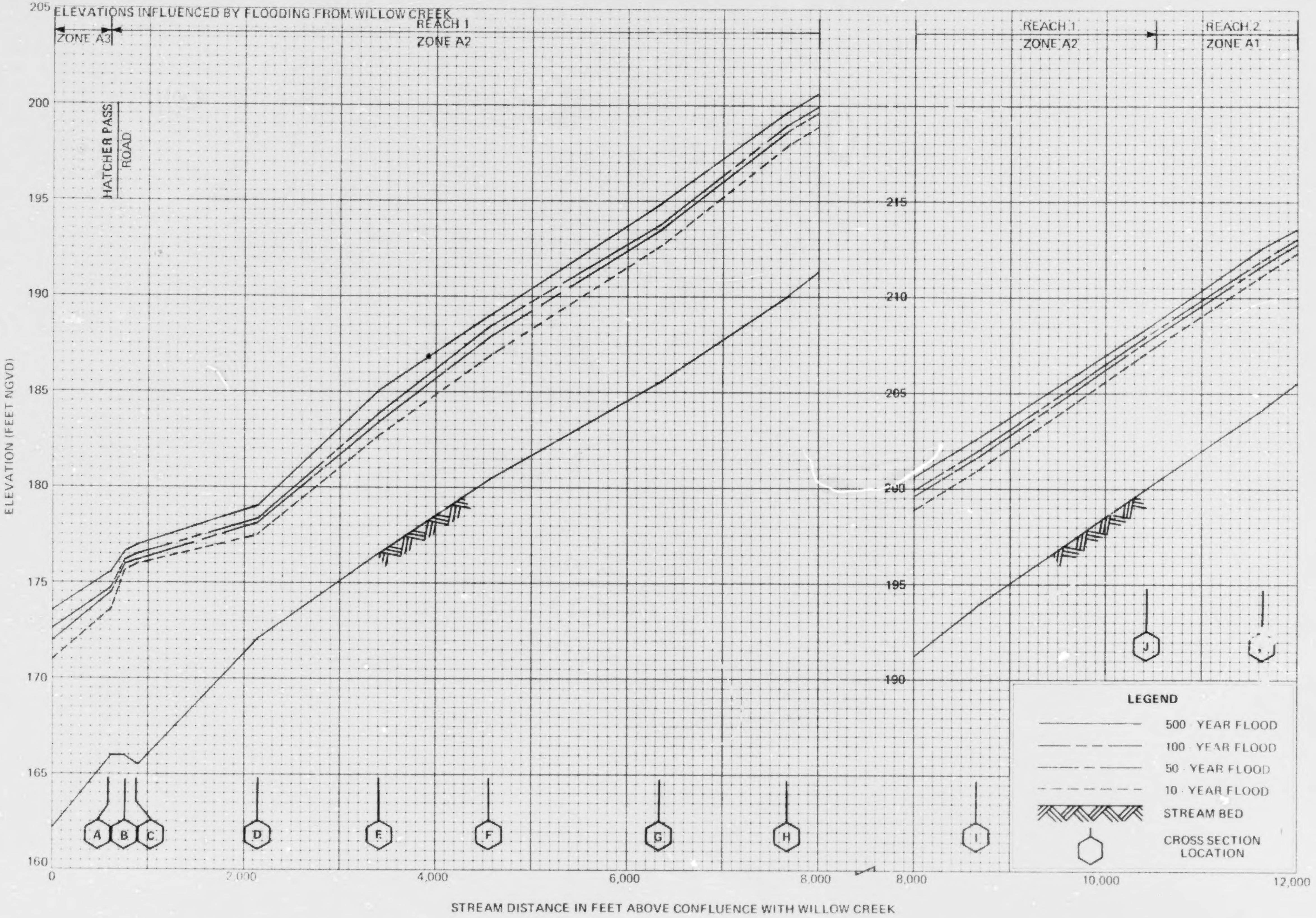


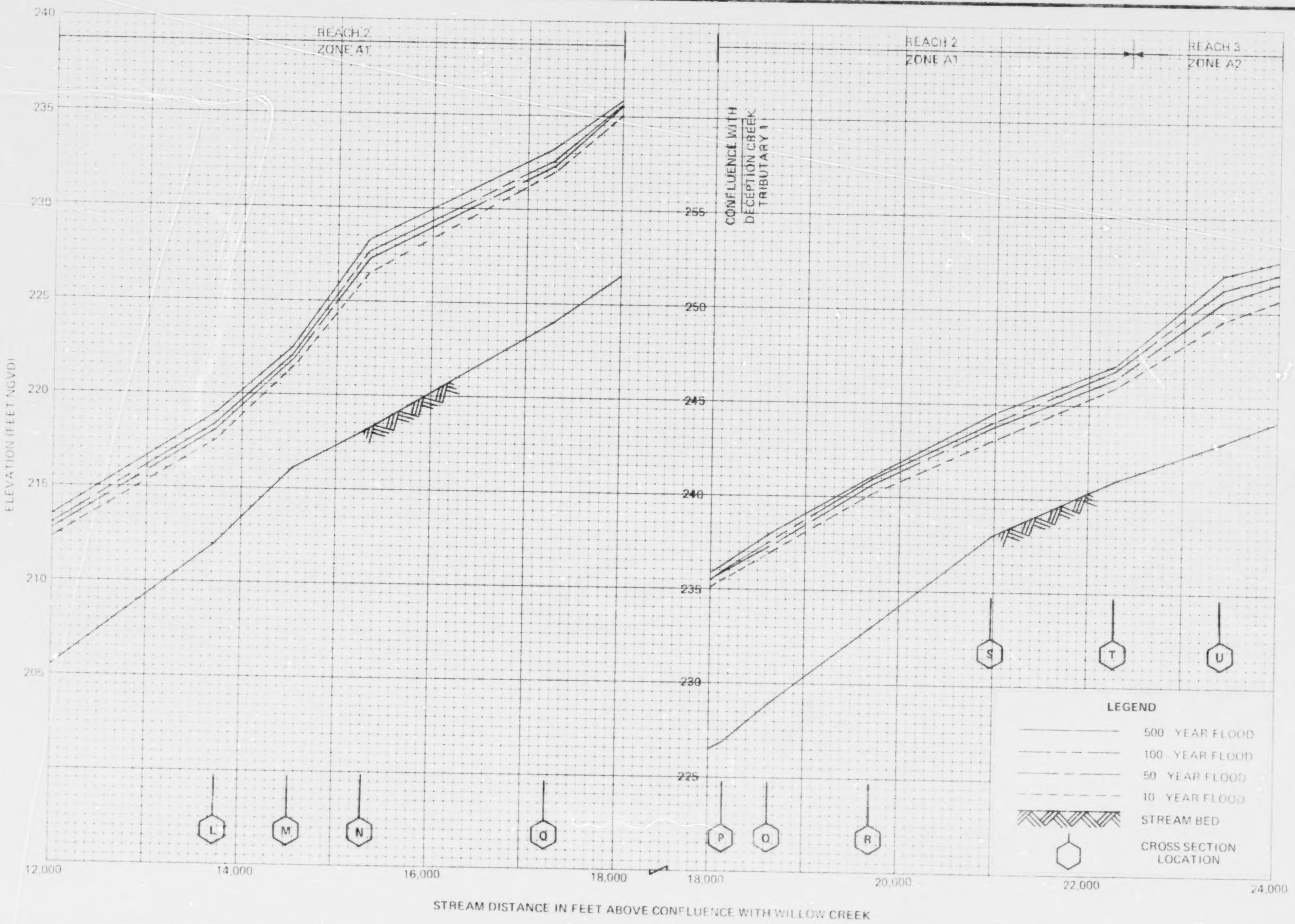
## FLOOD PROFILES

DECEPTION CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

01P



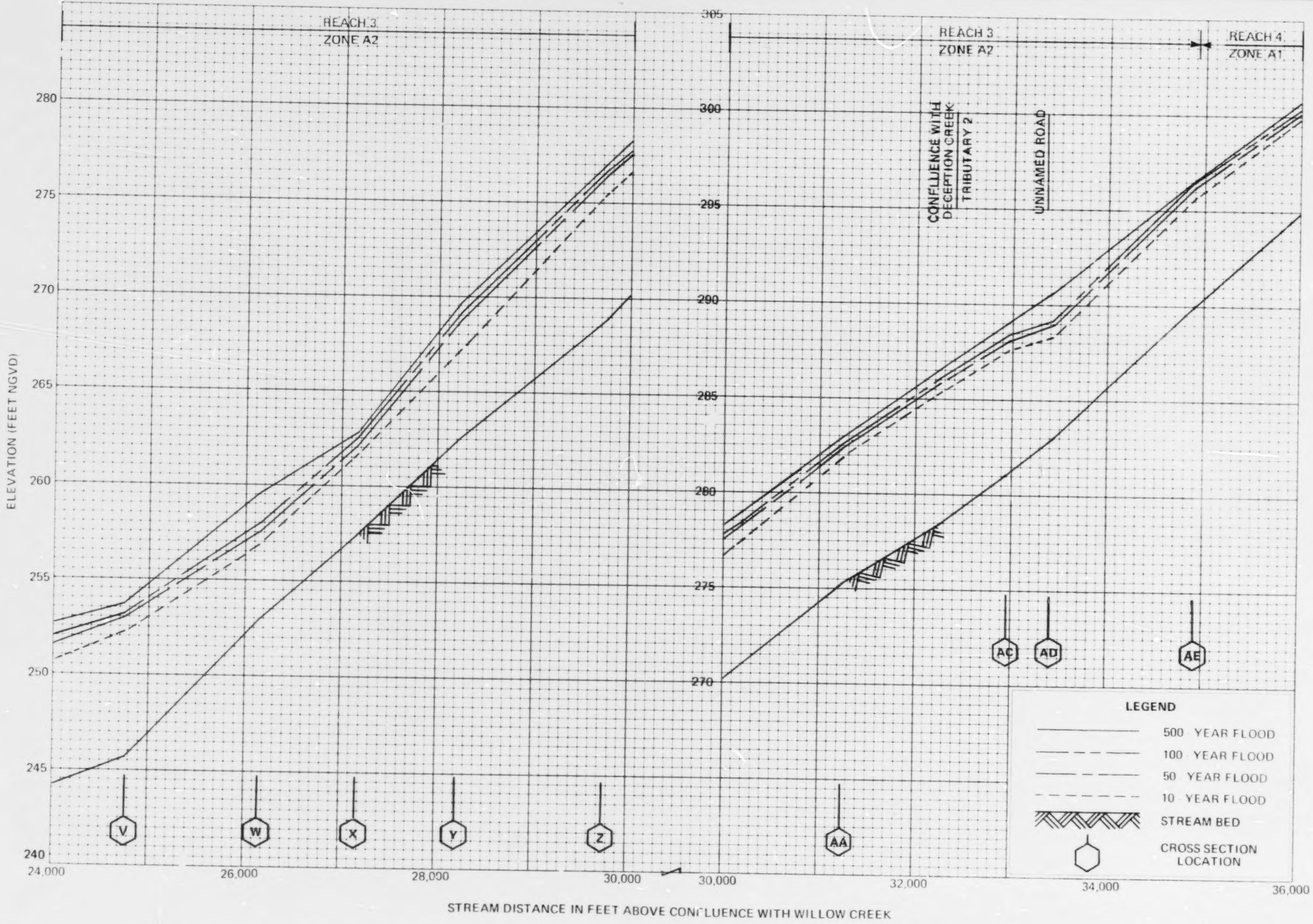
FLOOD PROFILES

DECEPTION CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA SUSITNA DIVISION)

02P



**FLOOD PROFILES**

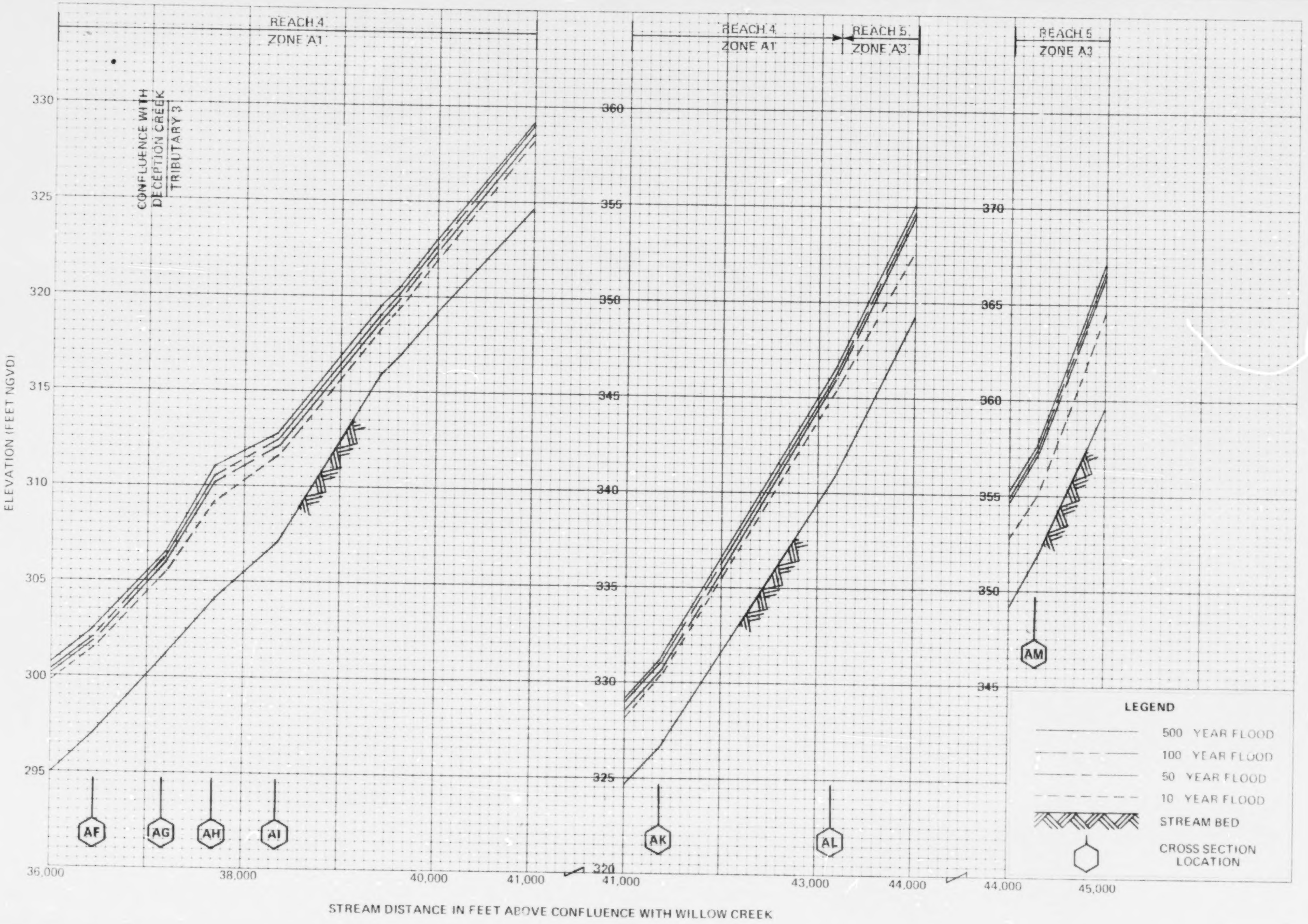
DECEPTION CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

03P

38



## FLOOD PROFILES

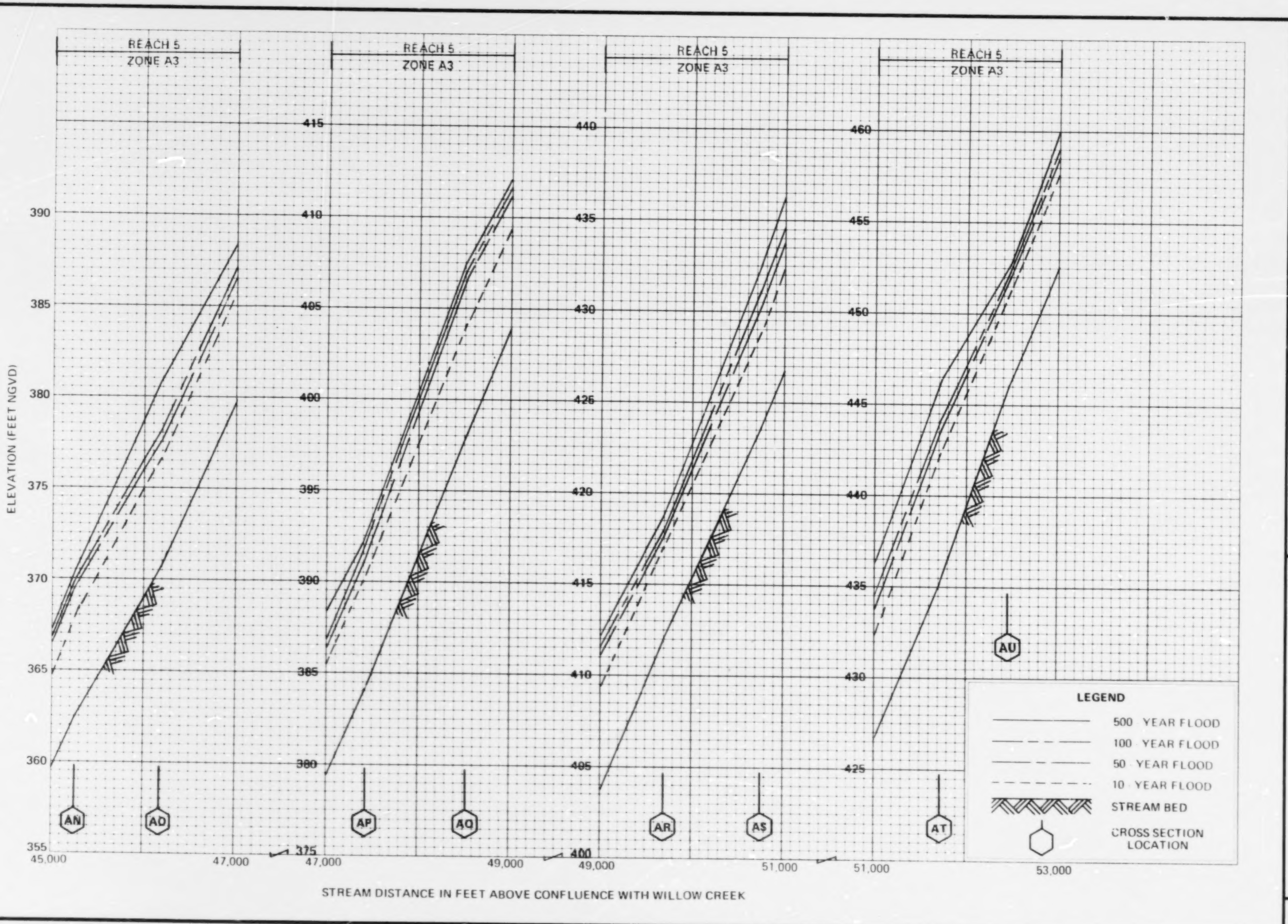
DECEPTION CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

04P

39



**FLOOD PROFILES**

DECEPTION CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

**MATANUSKA-SUSITNA BOROUGH, AK**
**(MATANUSKA-SUSITNA DIVISION)**

**05P**

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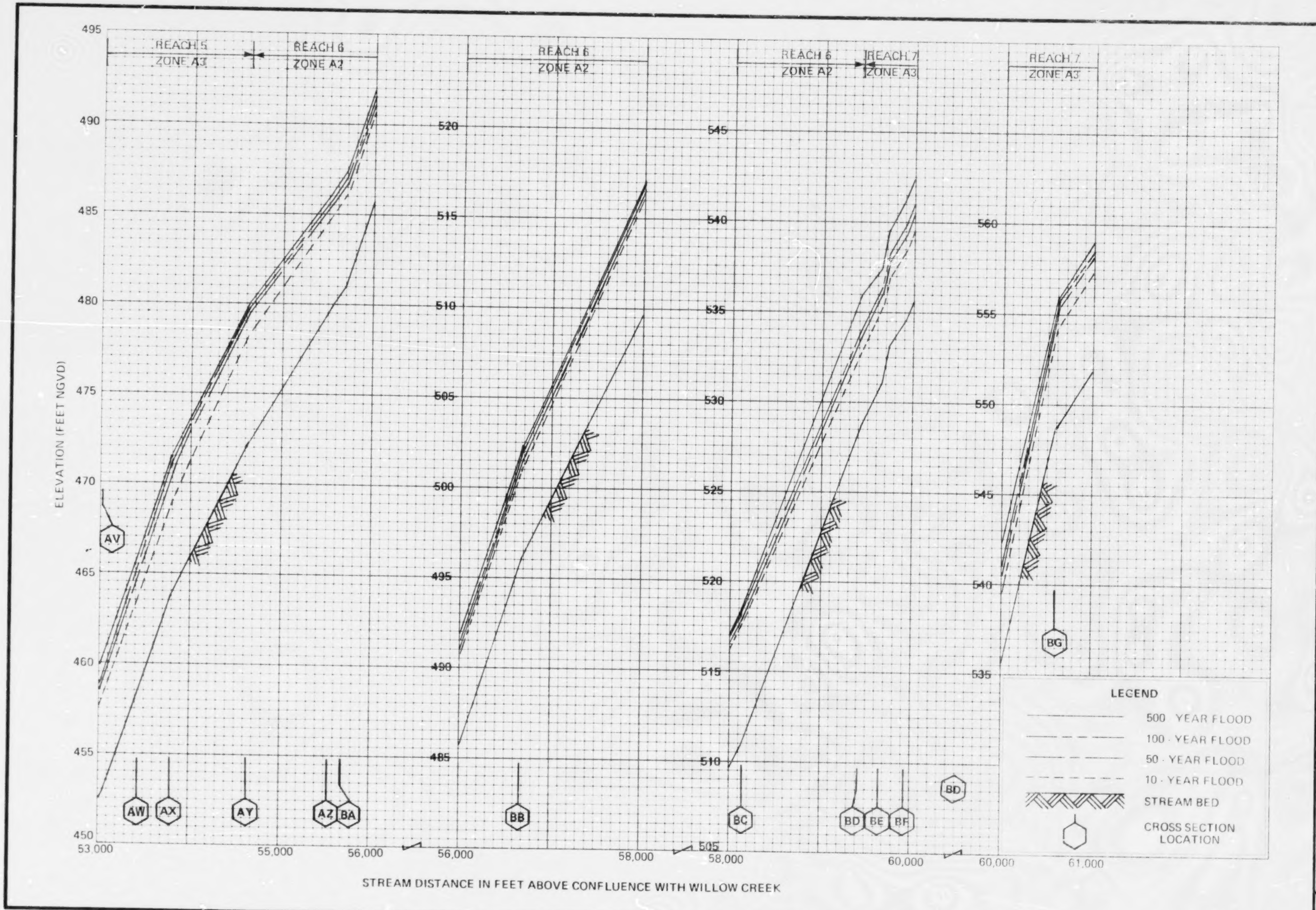


# FLOOD PROFILES

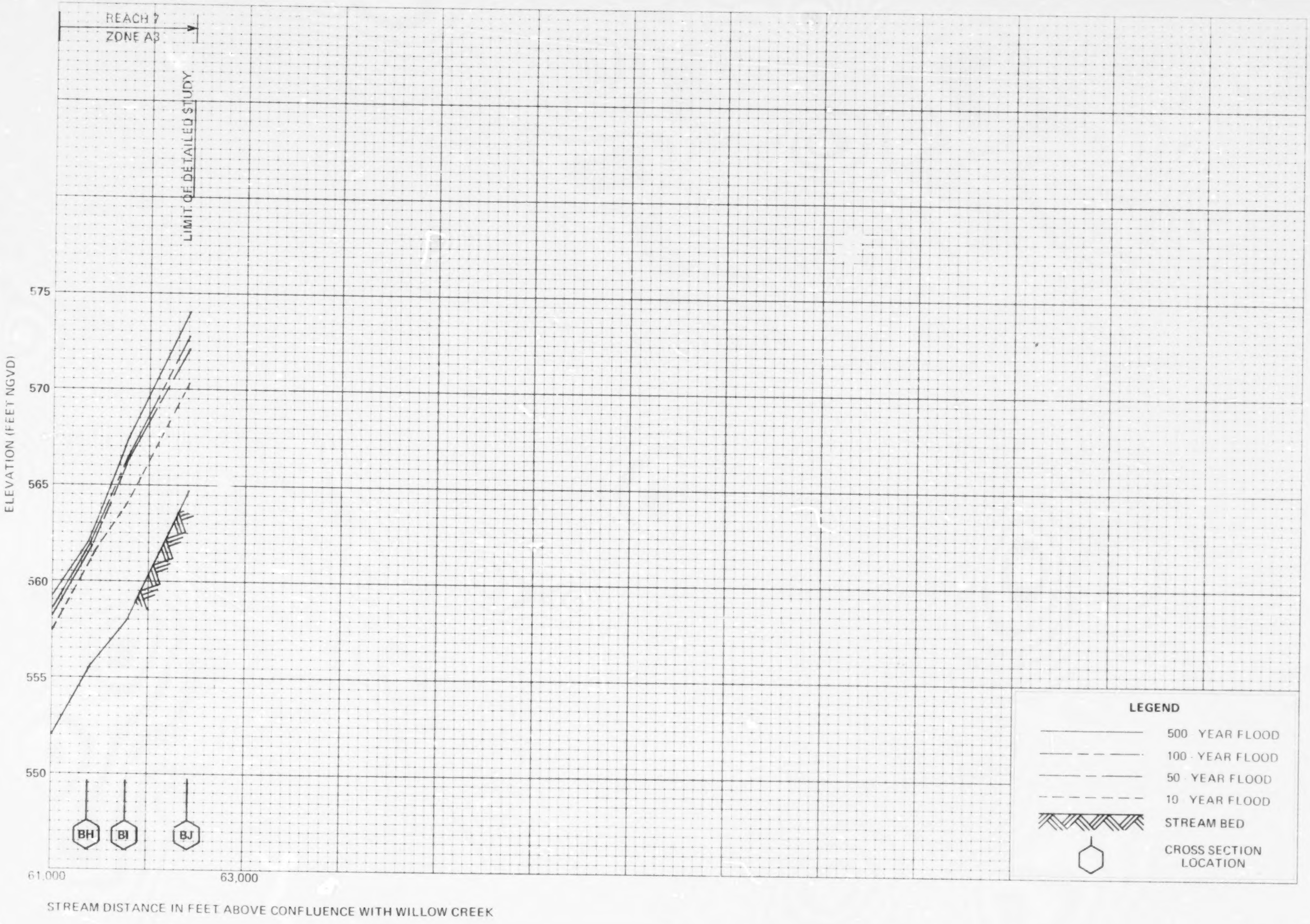
DECEPTION CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

06P

41



FEDERAL EMERGENCY MANAGEMENT AGENCY

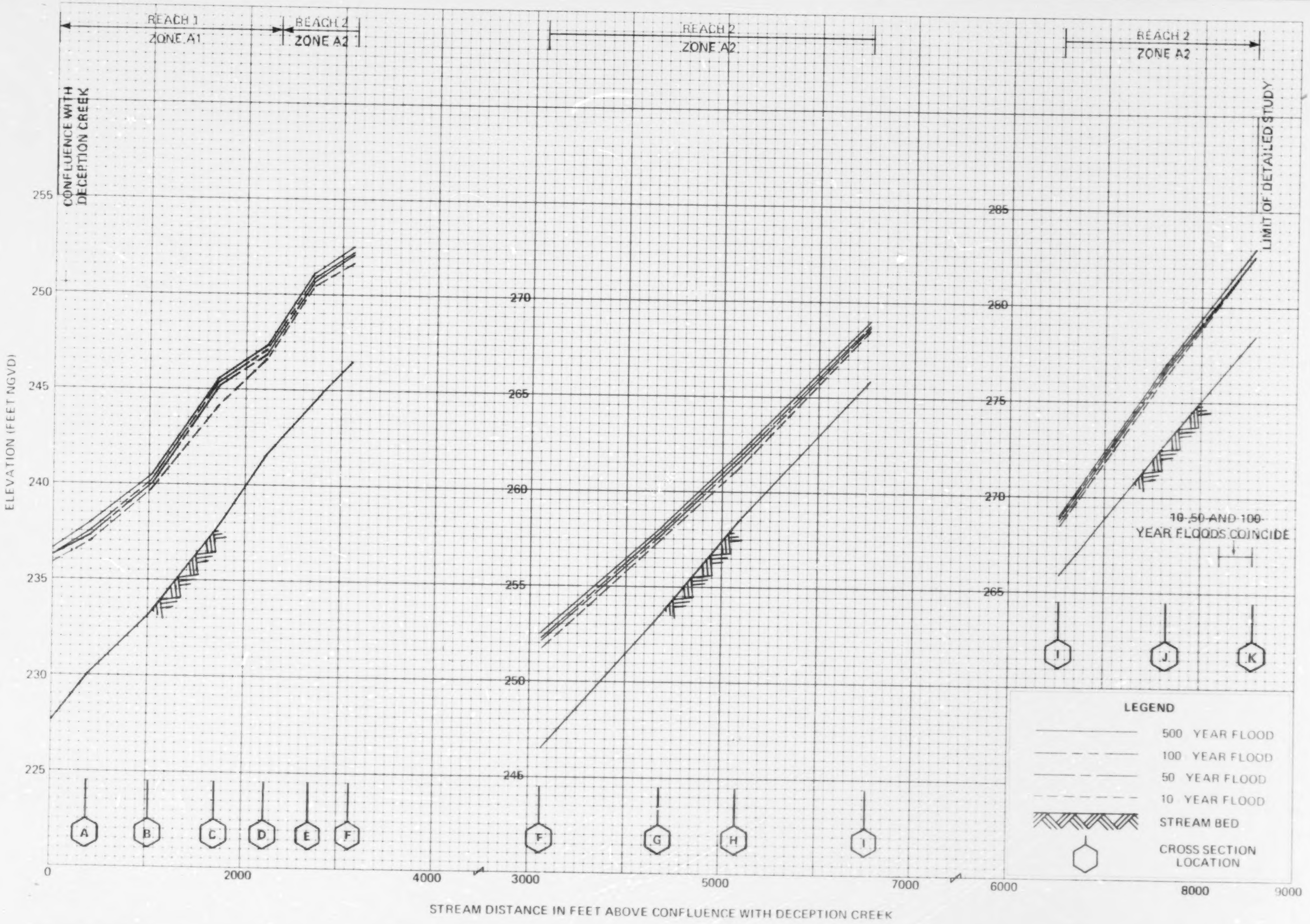
MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

# FLOOD PROFILES

DECEPTION CREEK

07P

42



# FLOOD PROFILES

DECEPTION CREEK TRIBUTARY 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

08P

43

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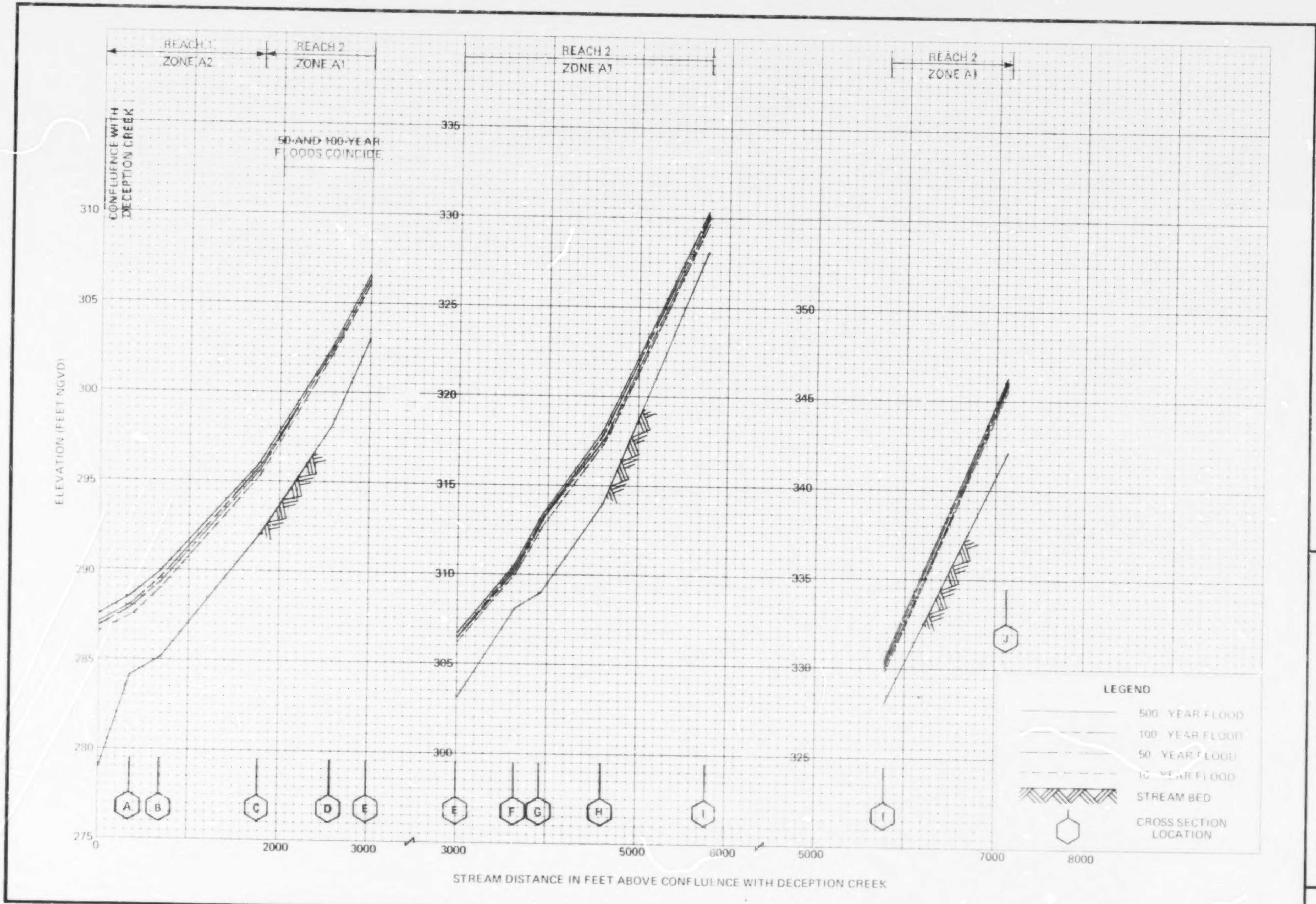


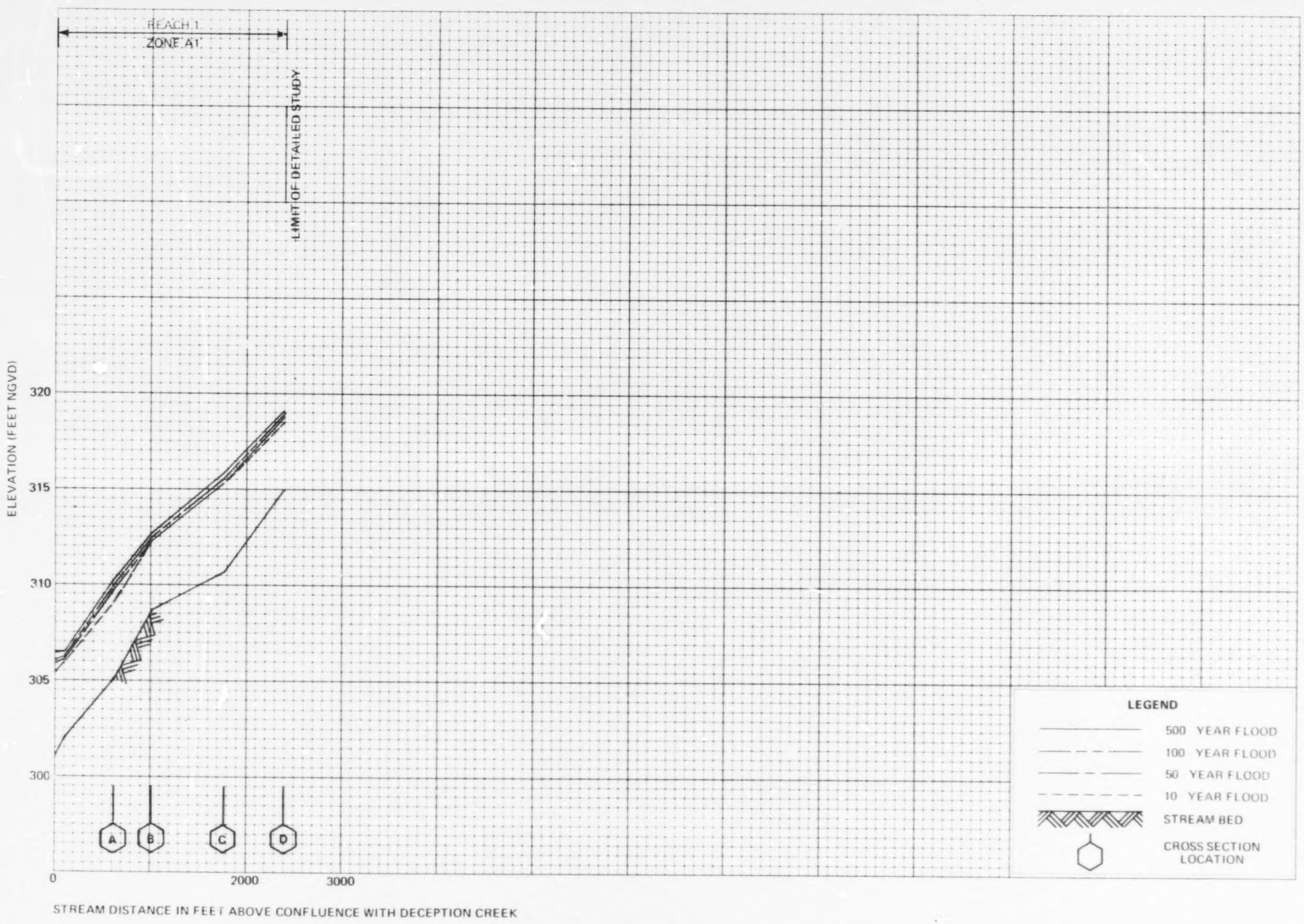
## FLOOD PROFILES

DECEPTION CREEK TRIBUTARY 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA SUSITNA DIVISION)

09P



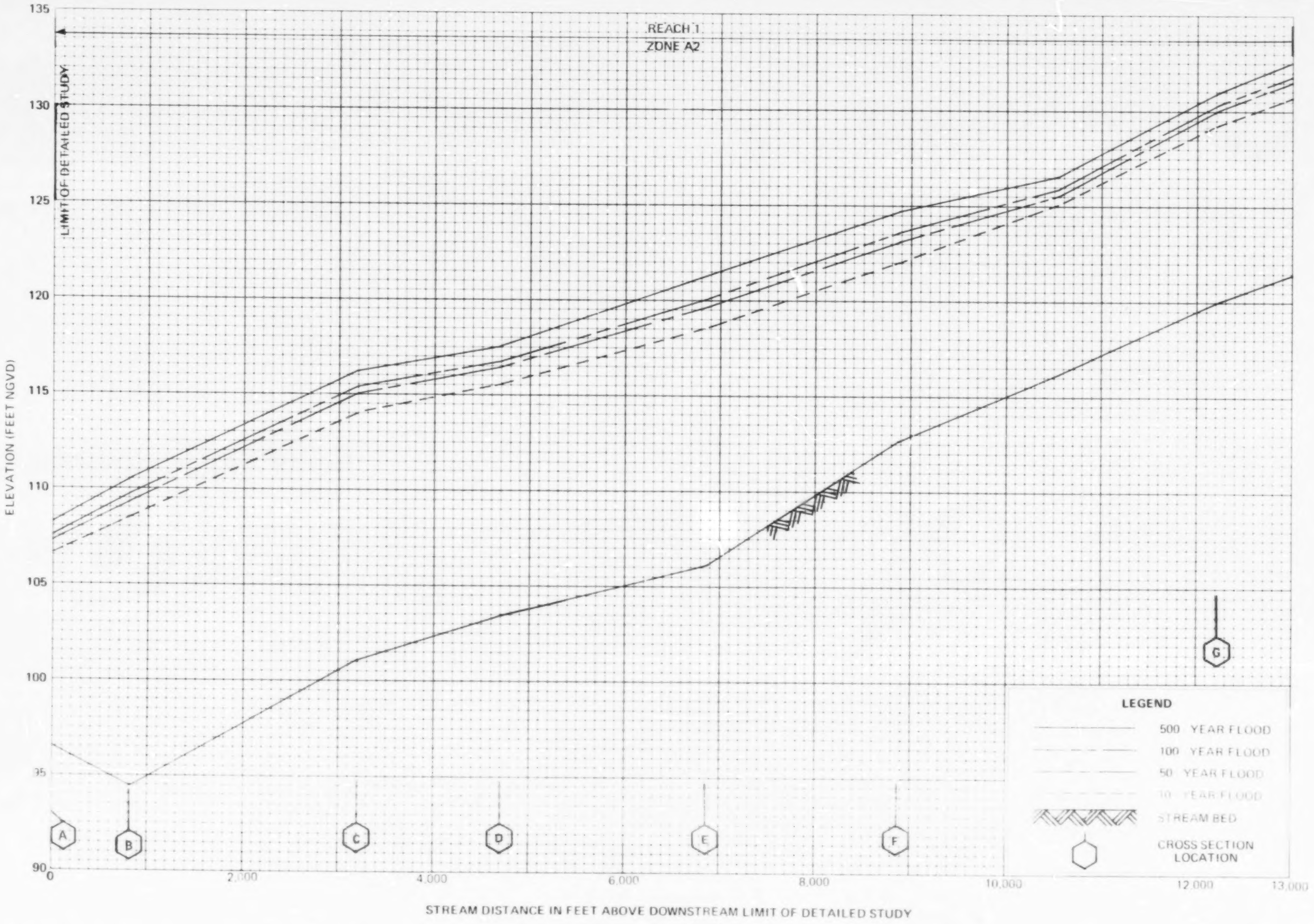
# FLOOD PROFILES

DECEPTION CREEK TRIBUTARY 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

10P



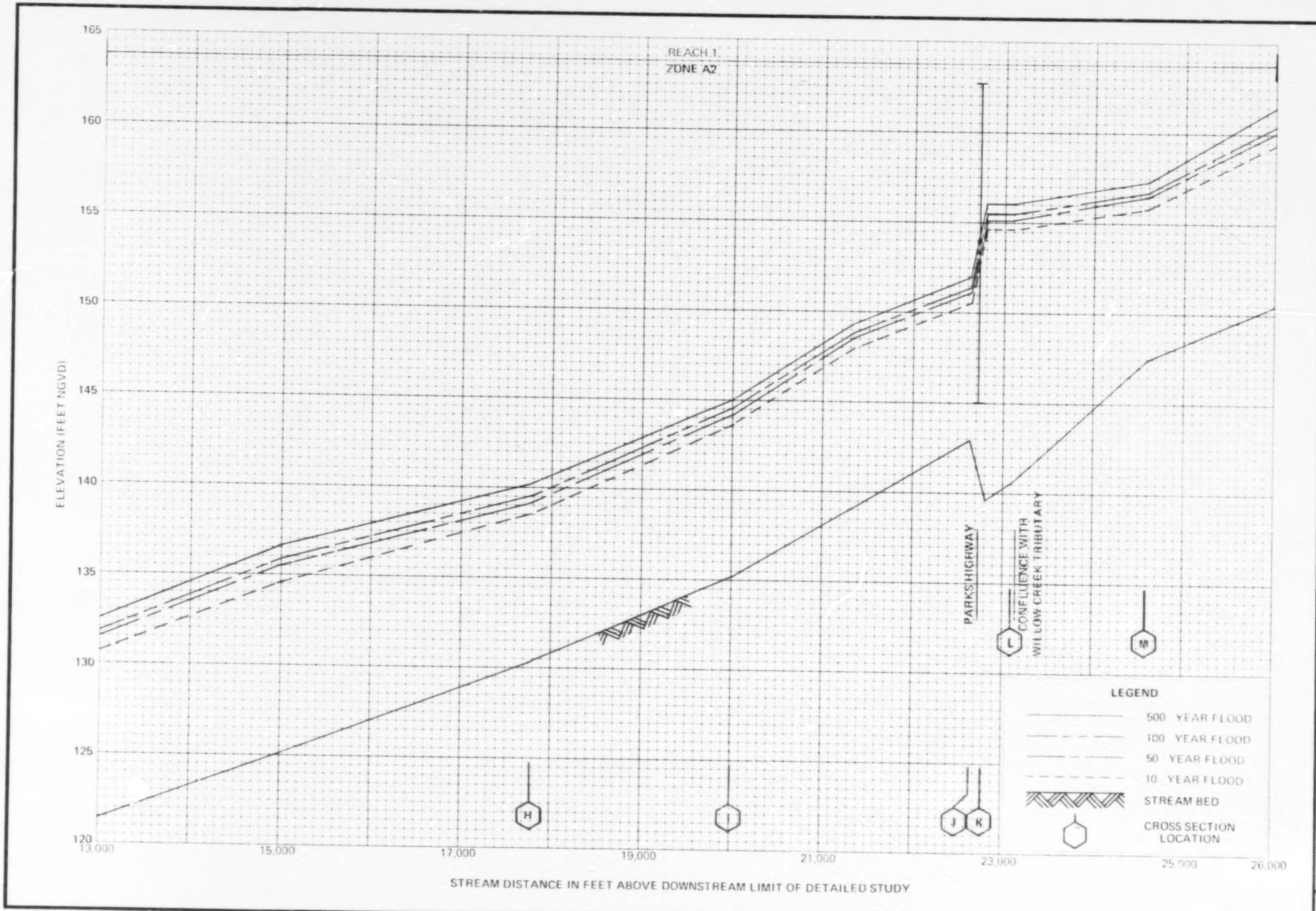
## FLOOD PROFILES

WILLOW CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA SUSITNA DIVISION)

11P



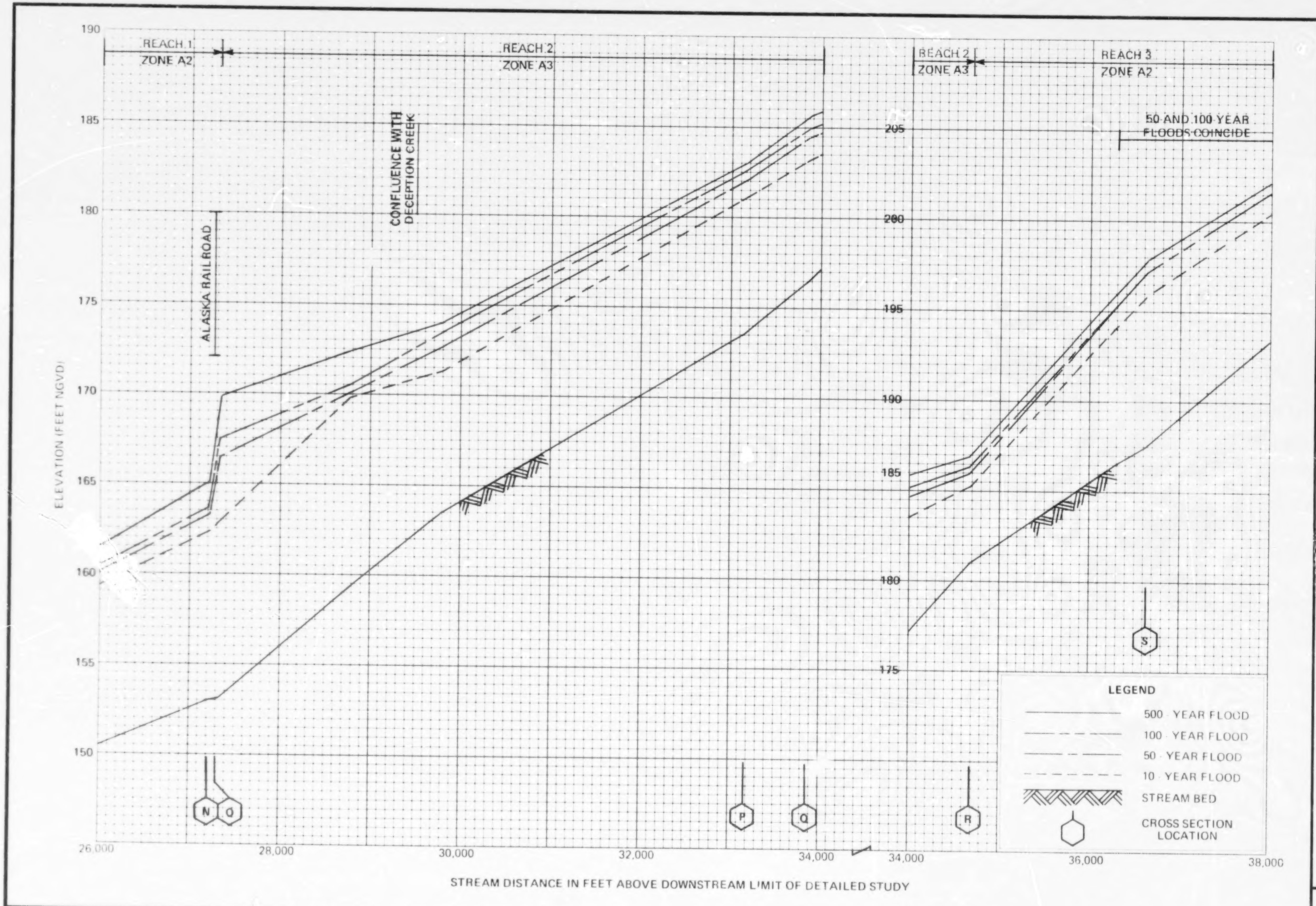
## FLOOD PROFILES

WILLOW CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA SUSITNA DIVISION)

12P



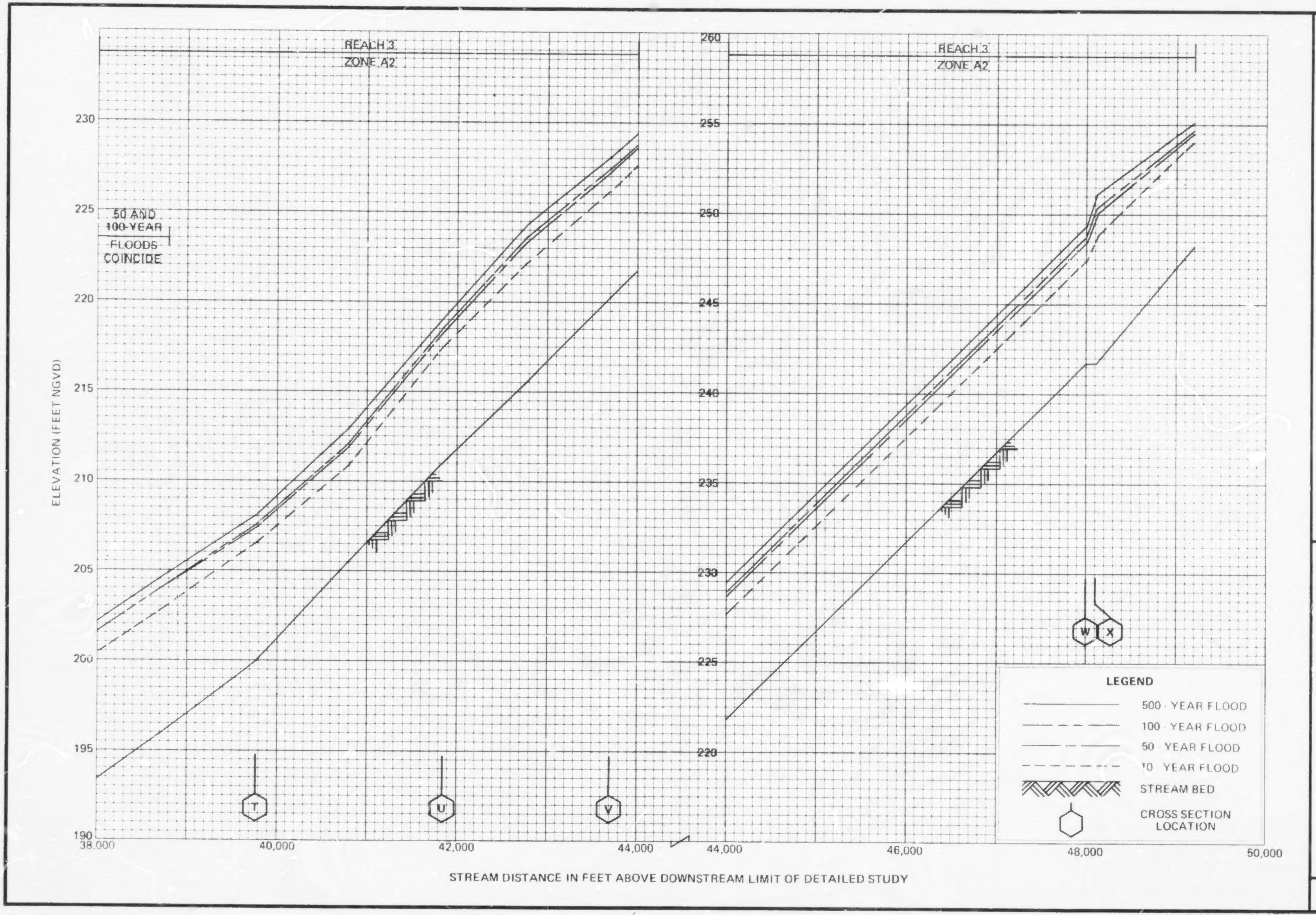
## FLOOD PROFILES

WILLOW CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

13P



## FLOOD PROFILES

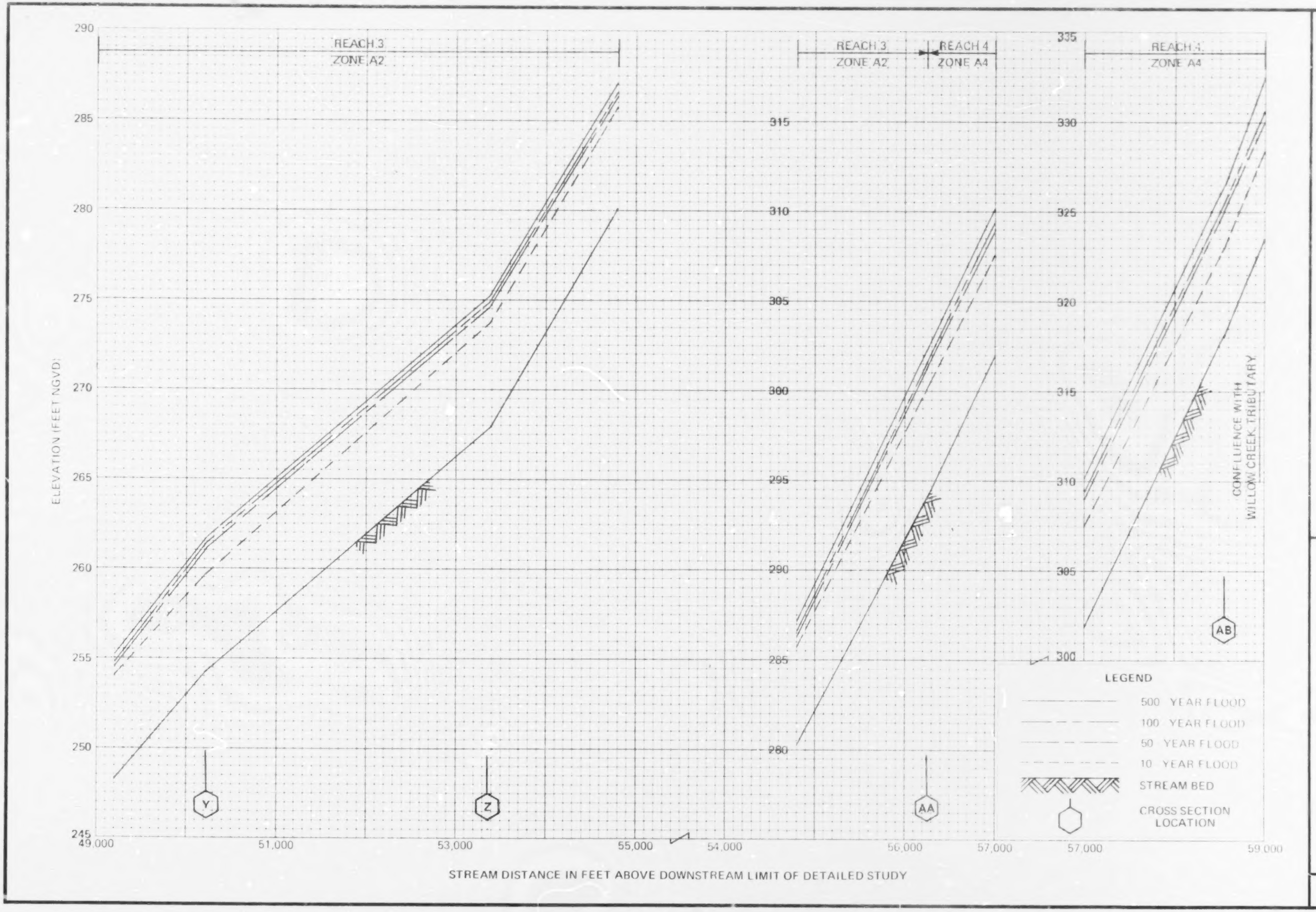
WILLOW CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

14P

49



# FLOOD PROFILES

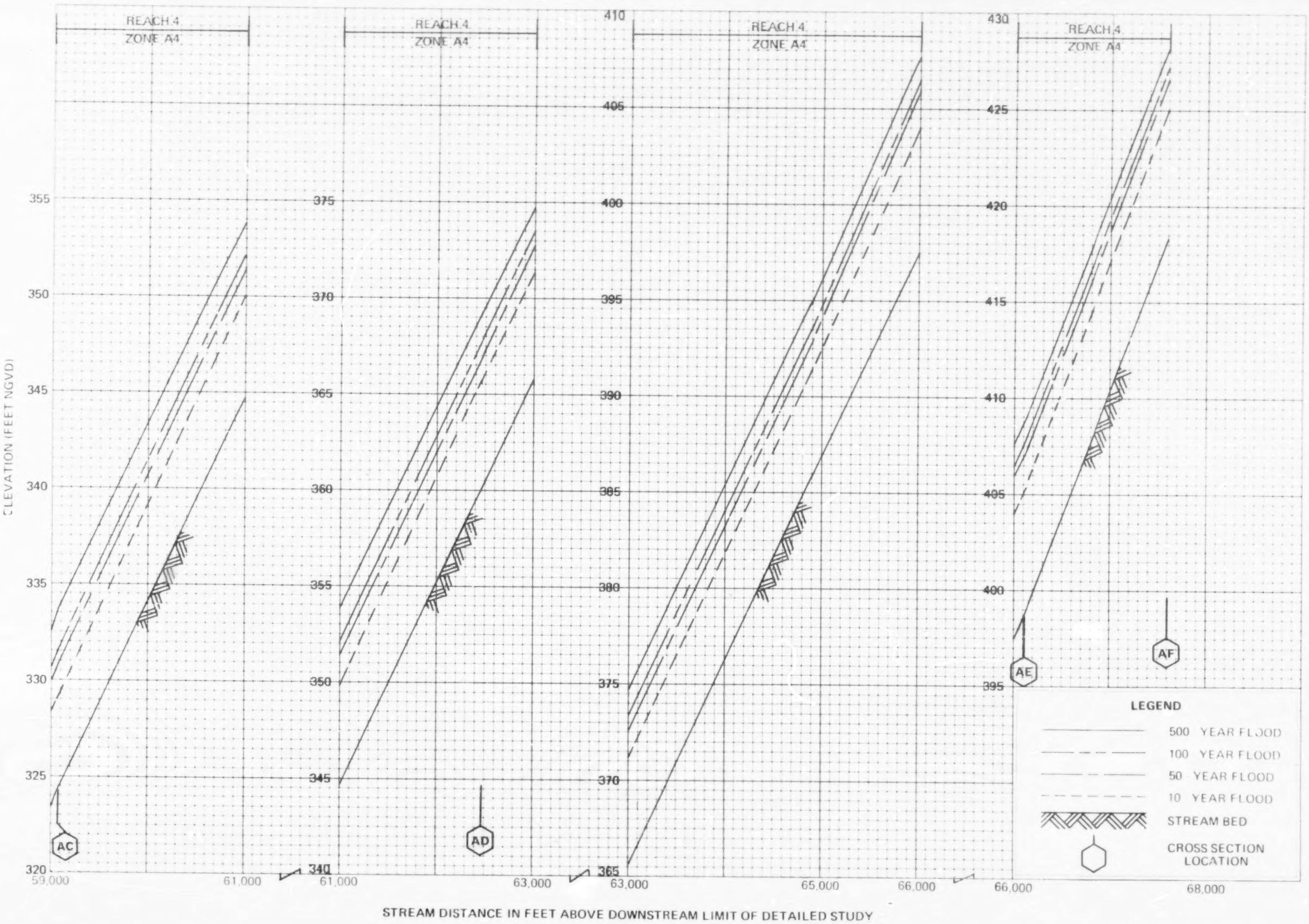
WILLOW CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

15P

50



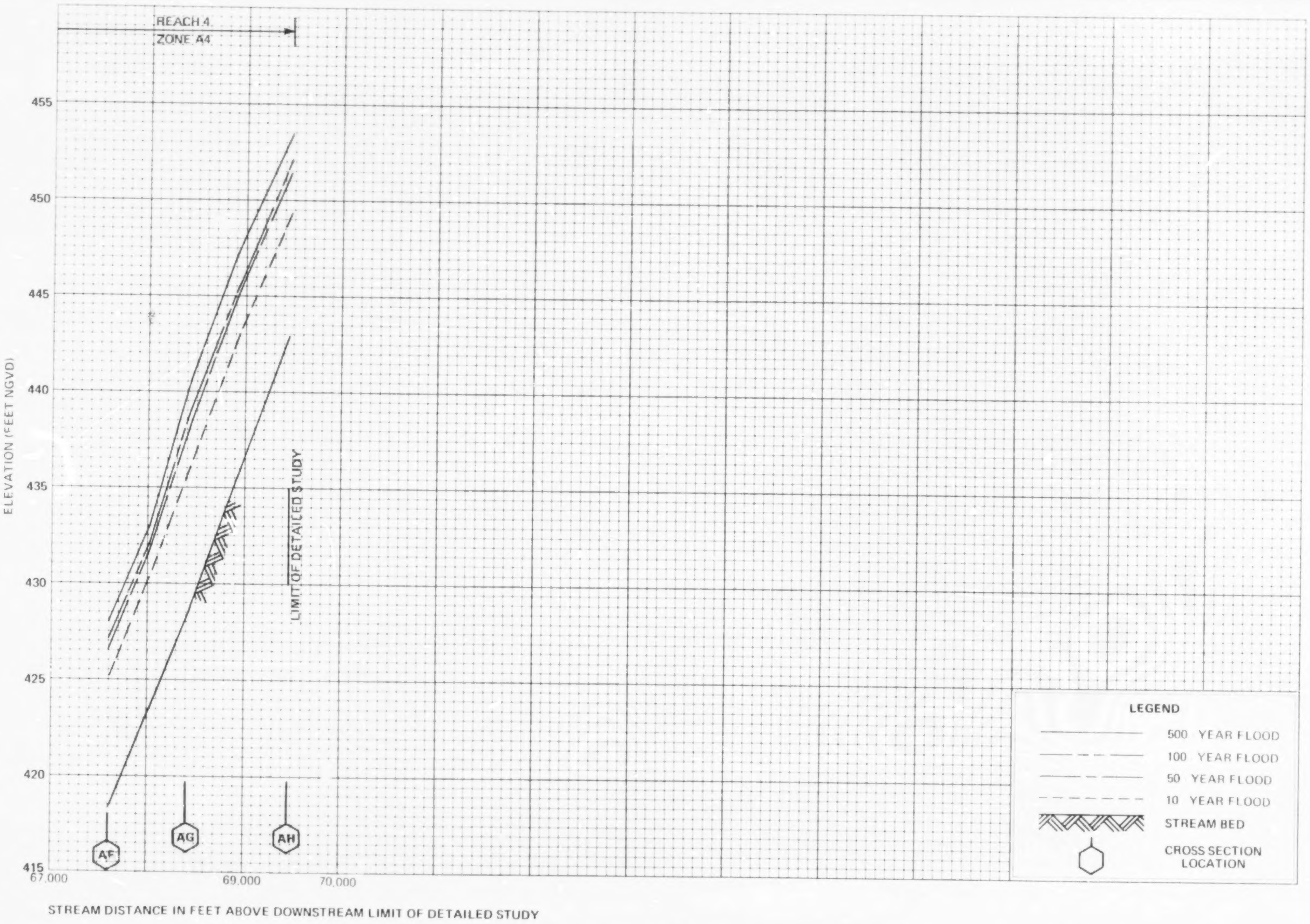
# FLOOD PROFILES

WILLOW CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

16P



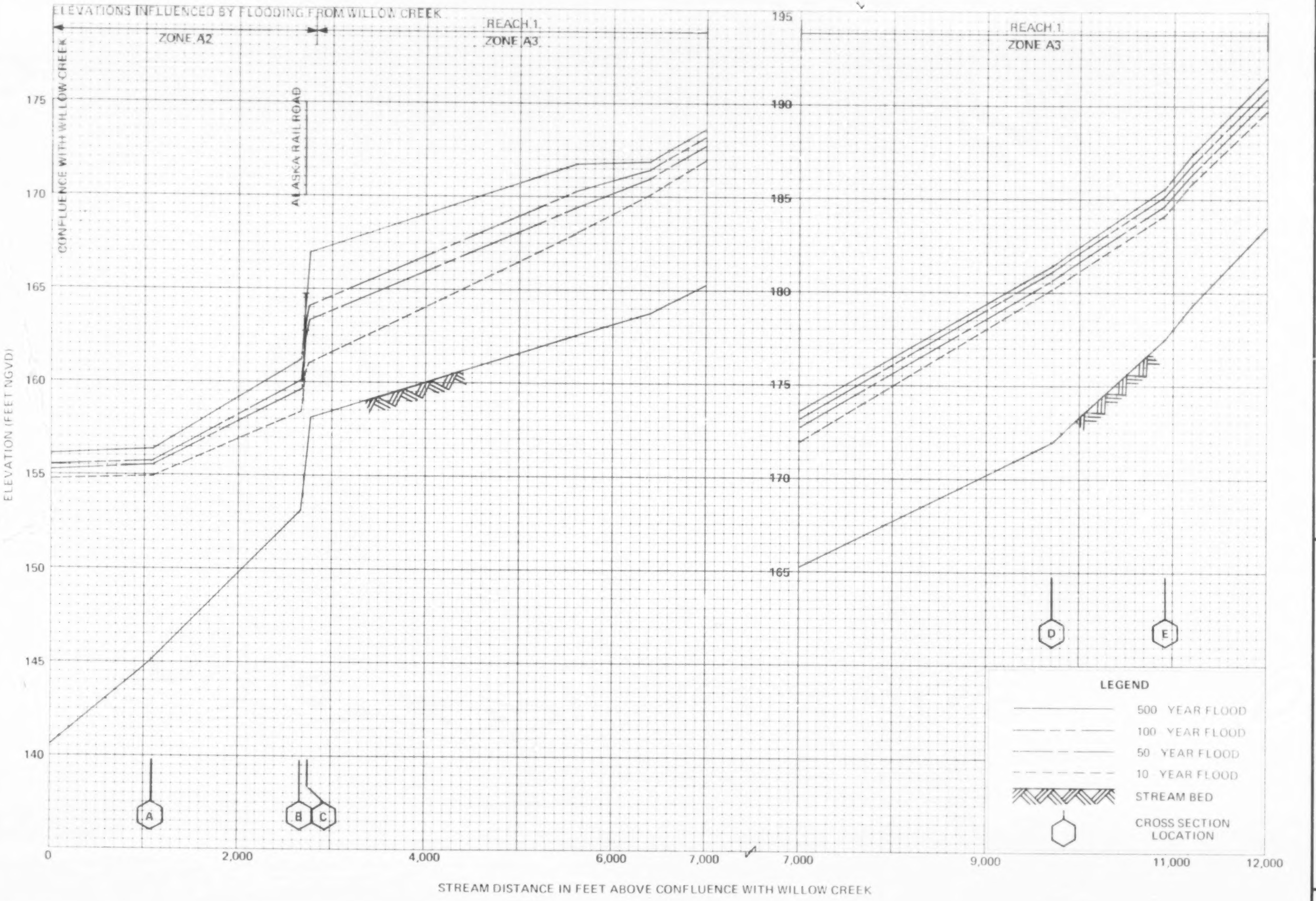
**FLOOD PROFILES**

WILLOW CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

**17P**



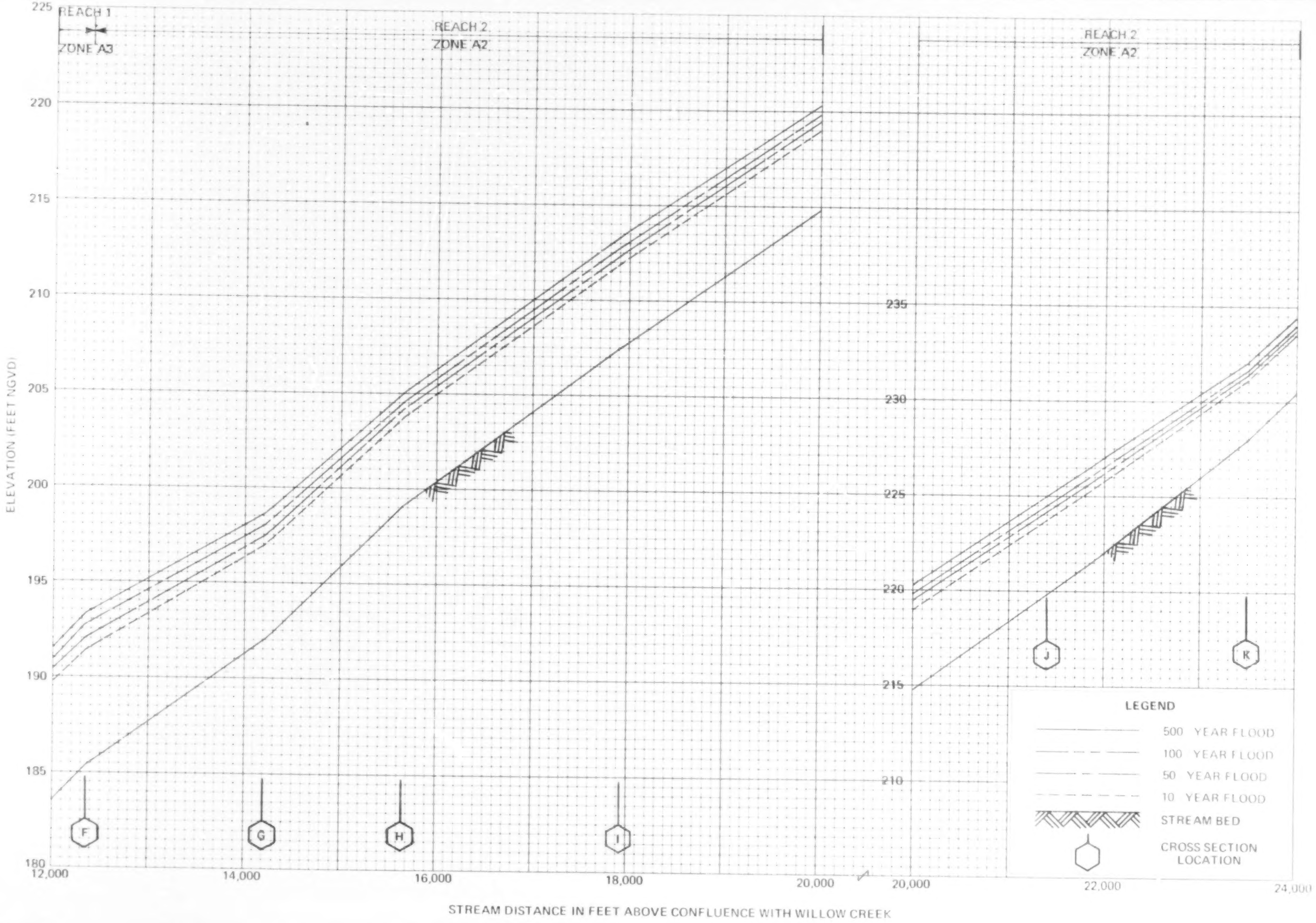
## FLOOD PROFILES

WILLOW CREEK TRIBUTARY

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

18P

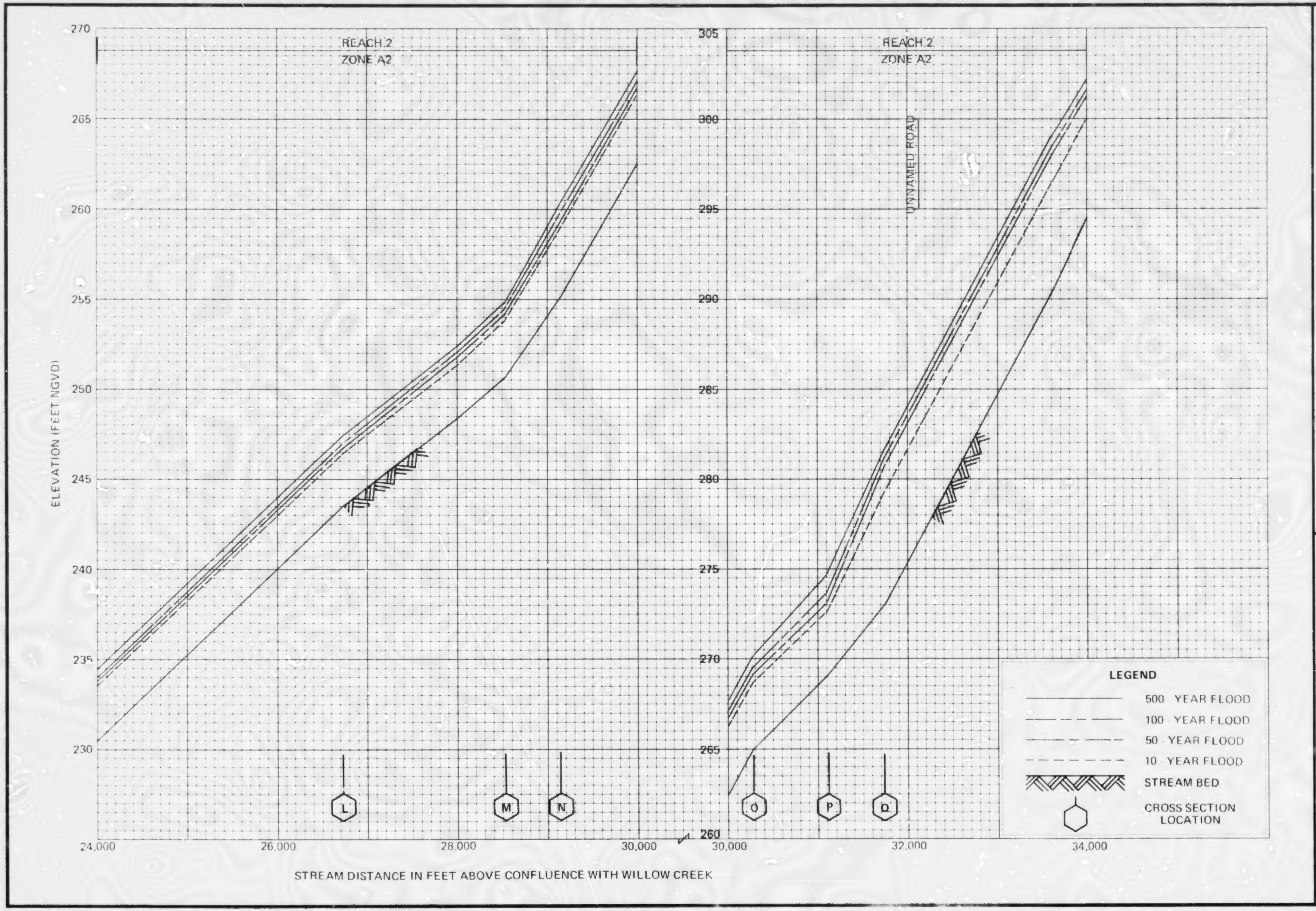


**FLOOD PROFILES**

WILLOW CREEK TRIBUTARY

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)



## FLOOD PROFILES

WILLOW CREEK TRIBUTARY

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

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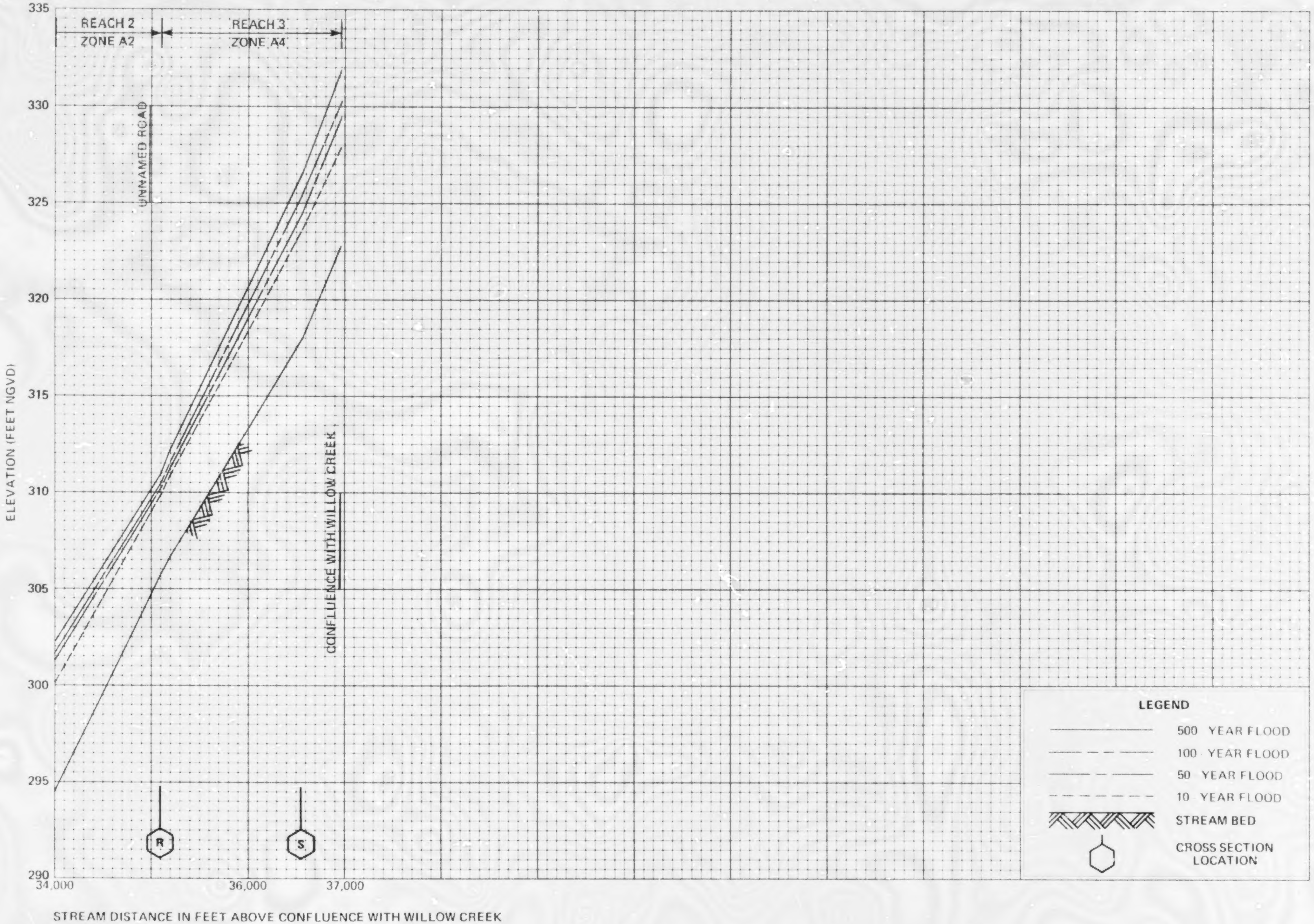


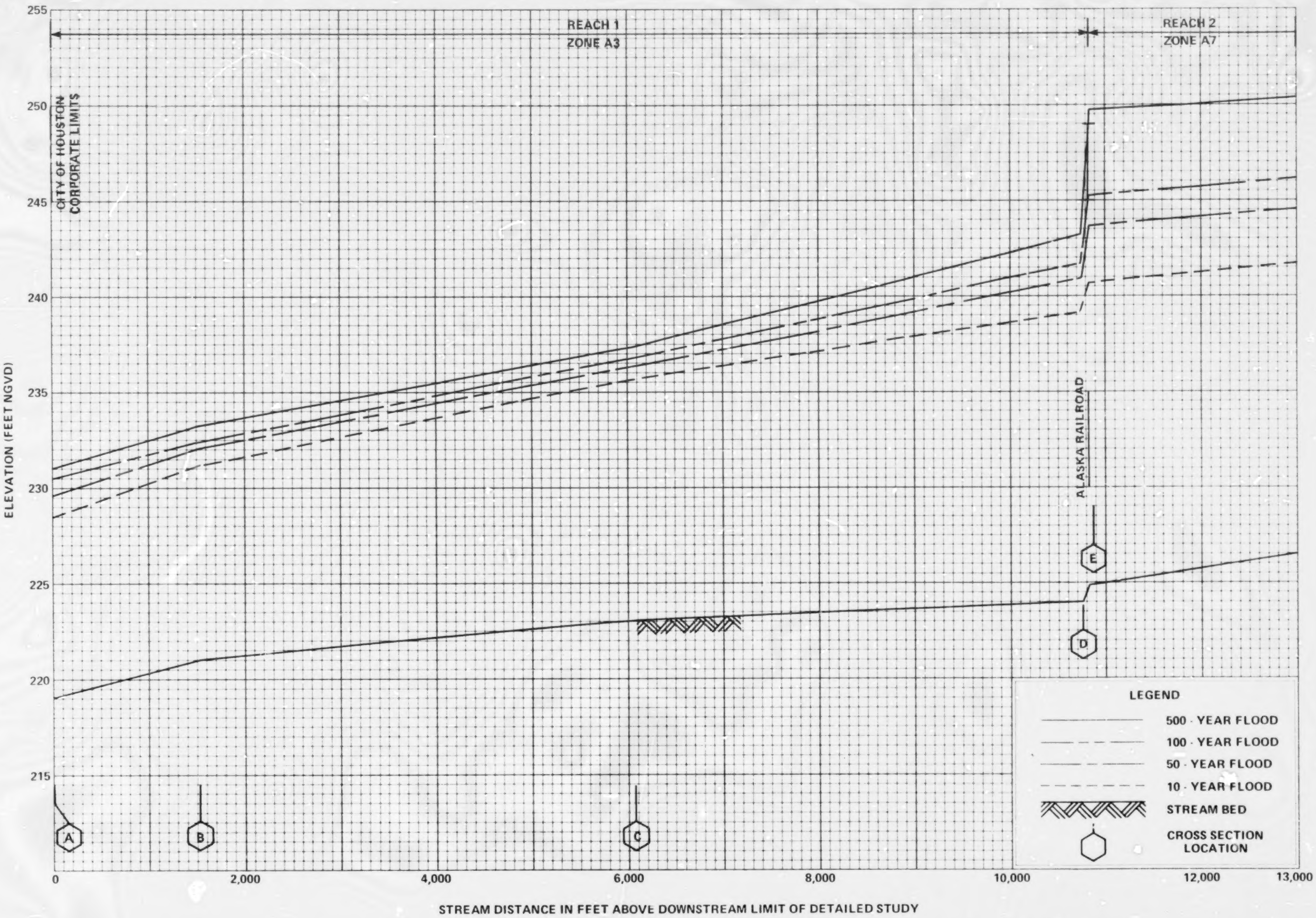
# FLOOD PROFILES

WILLOW CREEK TRIBUTARY

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

**21P**



## FLOOD PROFILES

LITTLE SUSITNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

**22P**

57

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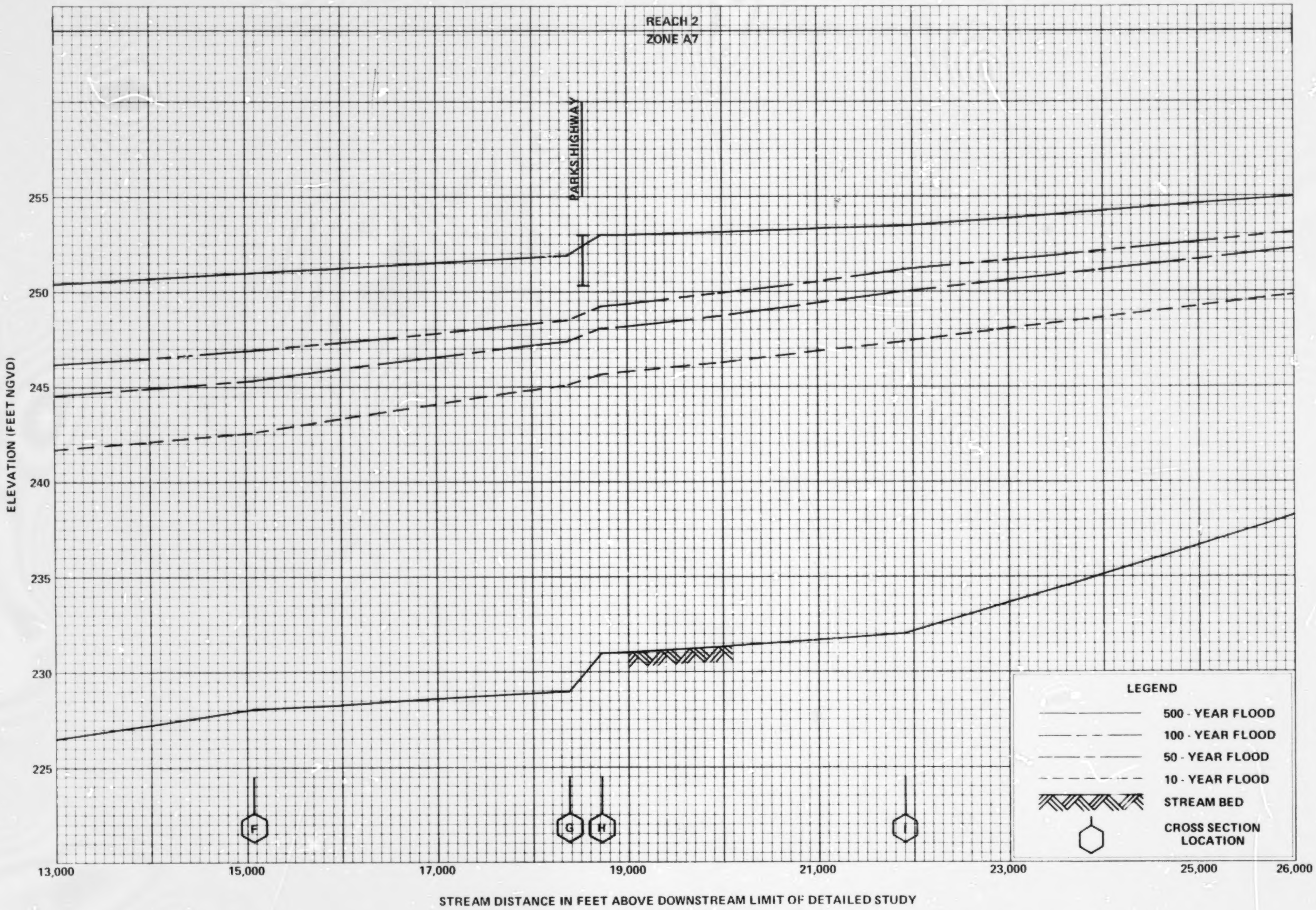


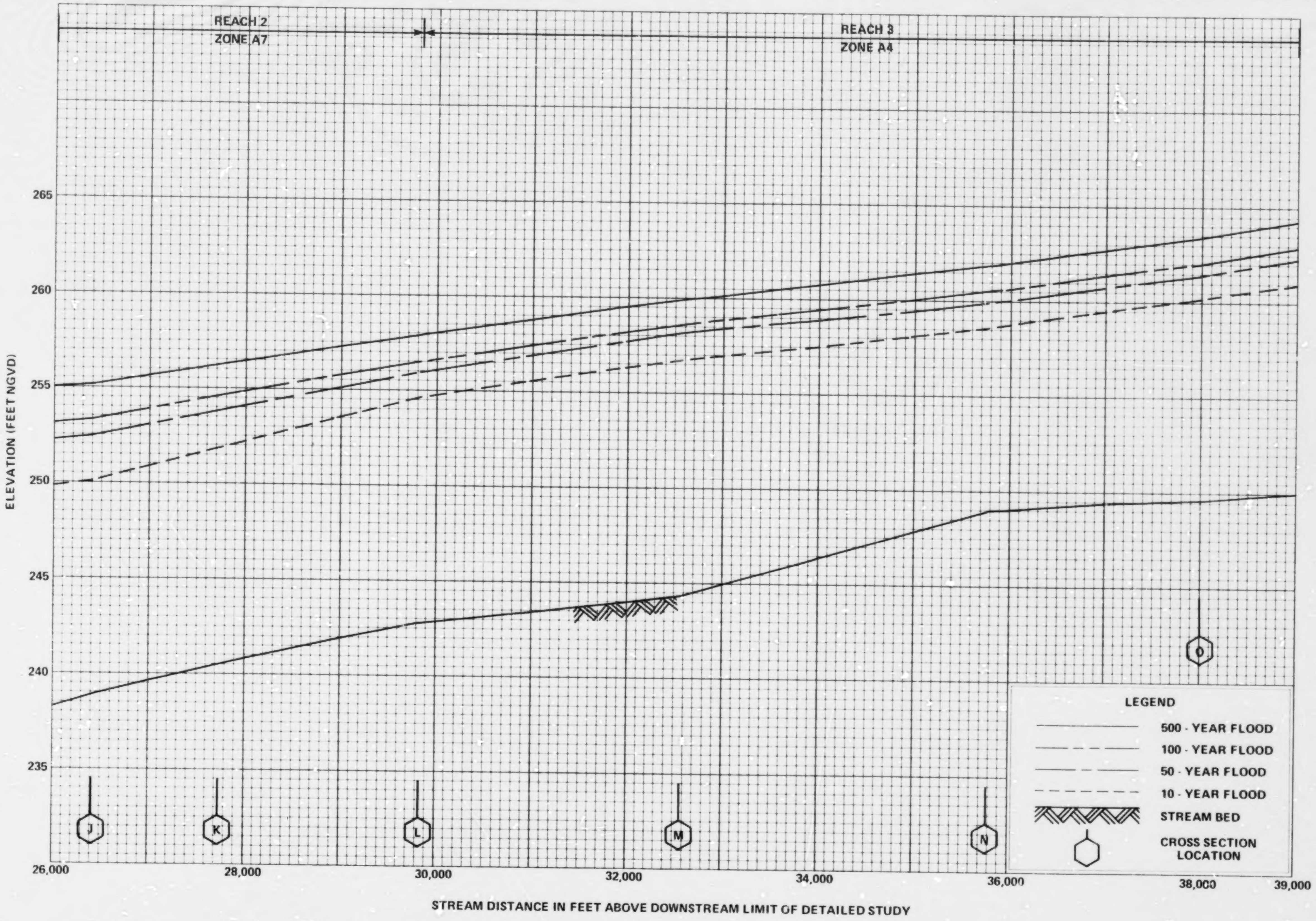
FLOOD PROFILES

LITTLE SUSITNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

23P



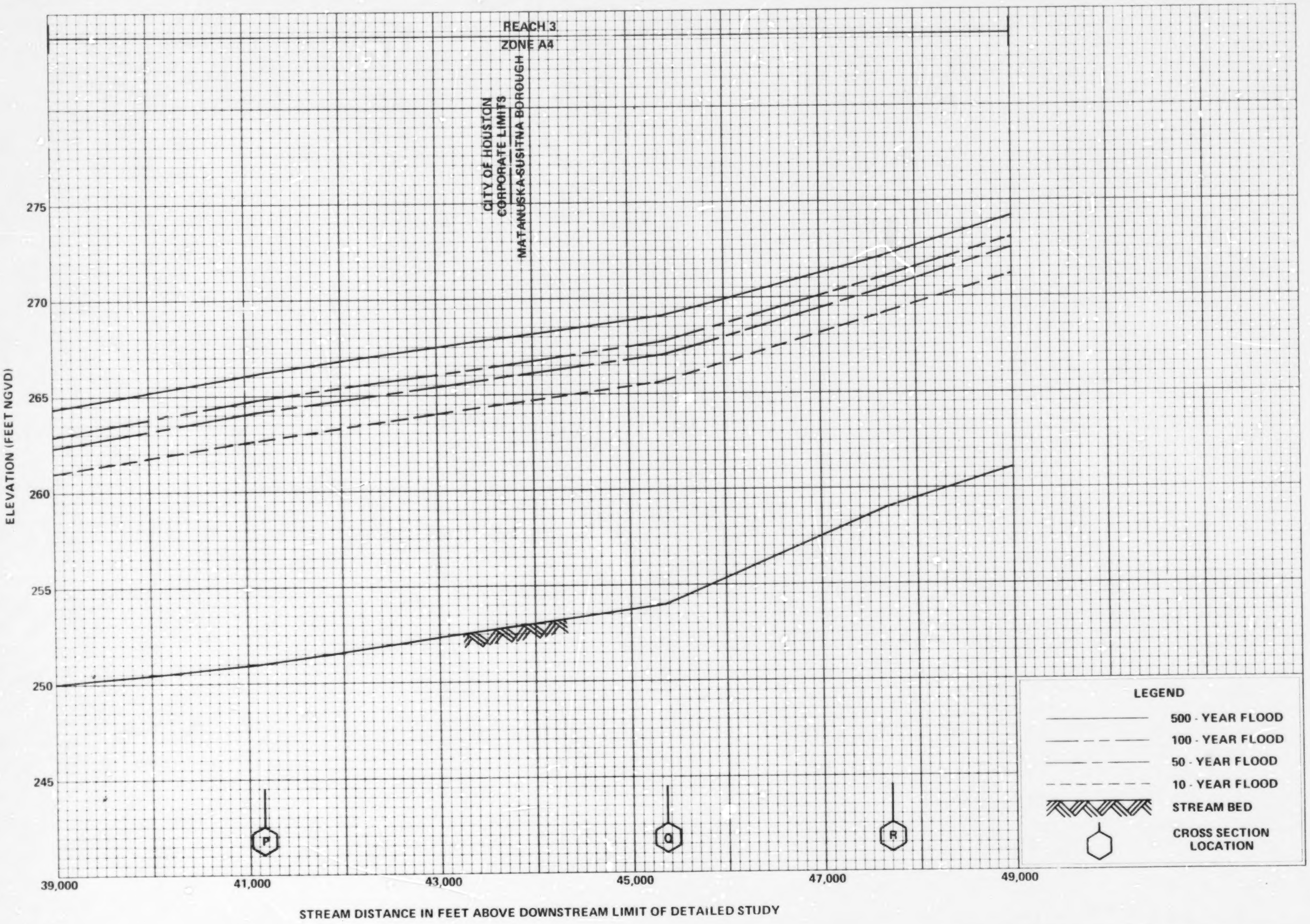
# FLOOD PROFILES

LITTLE SUSITNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

24P



FLOOD PROFILES

LITTLE SUSITNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

25P

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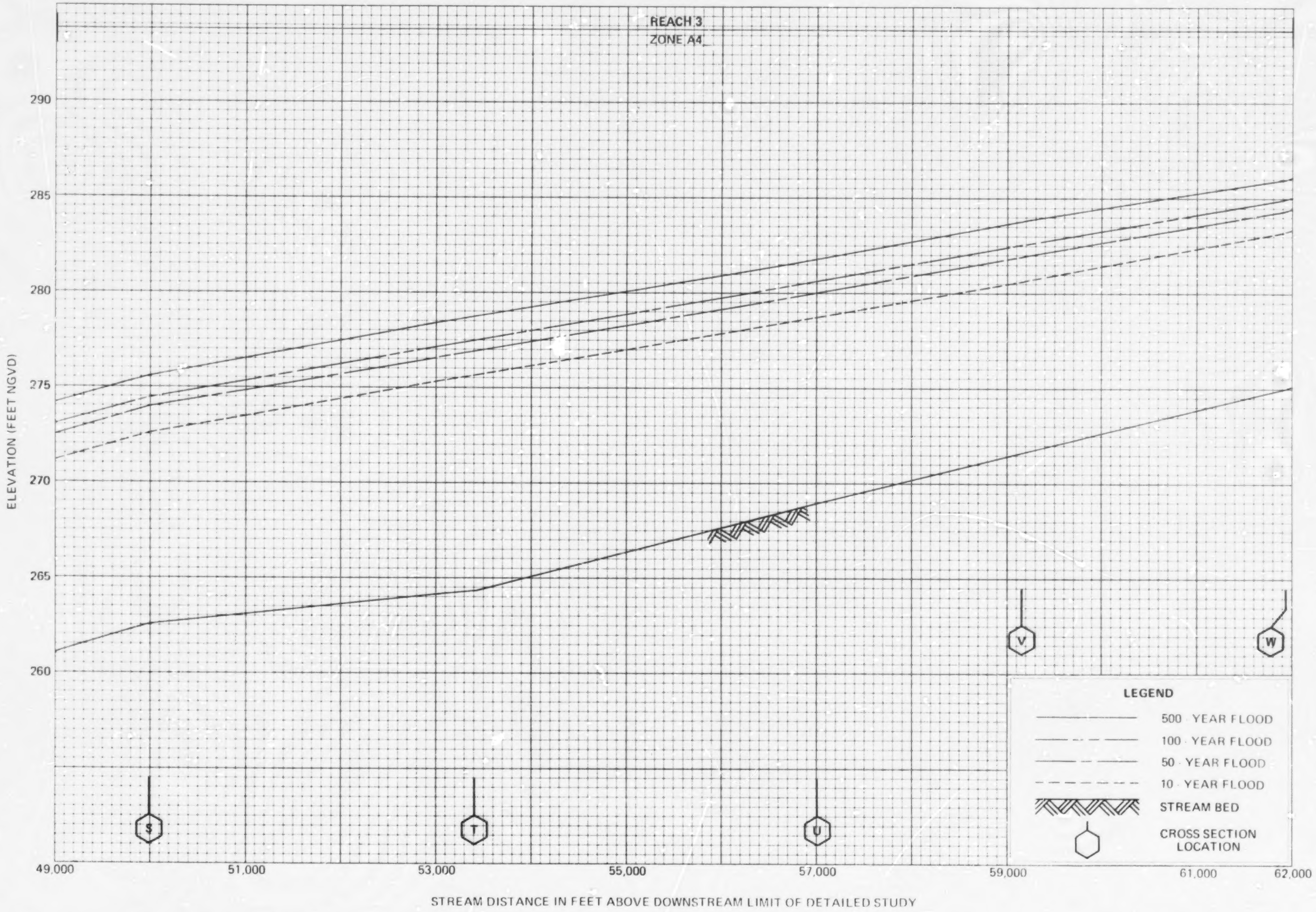


## FLOOD PROFILES

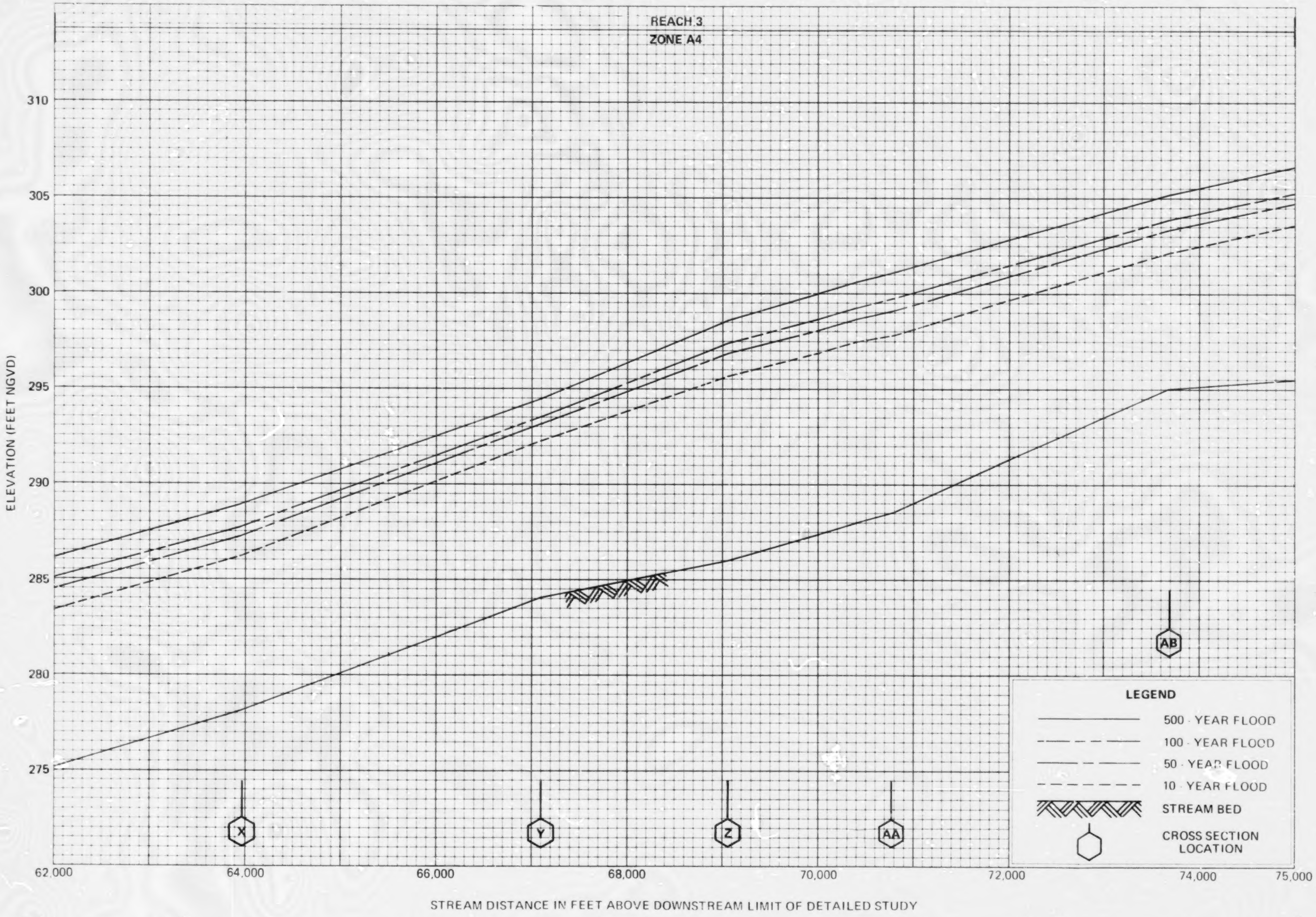
LITTLE SUSITNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

**26P**

61

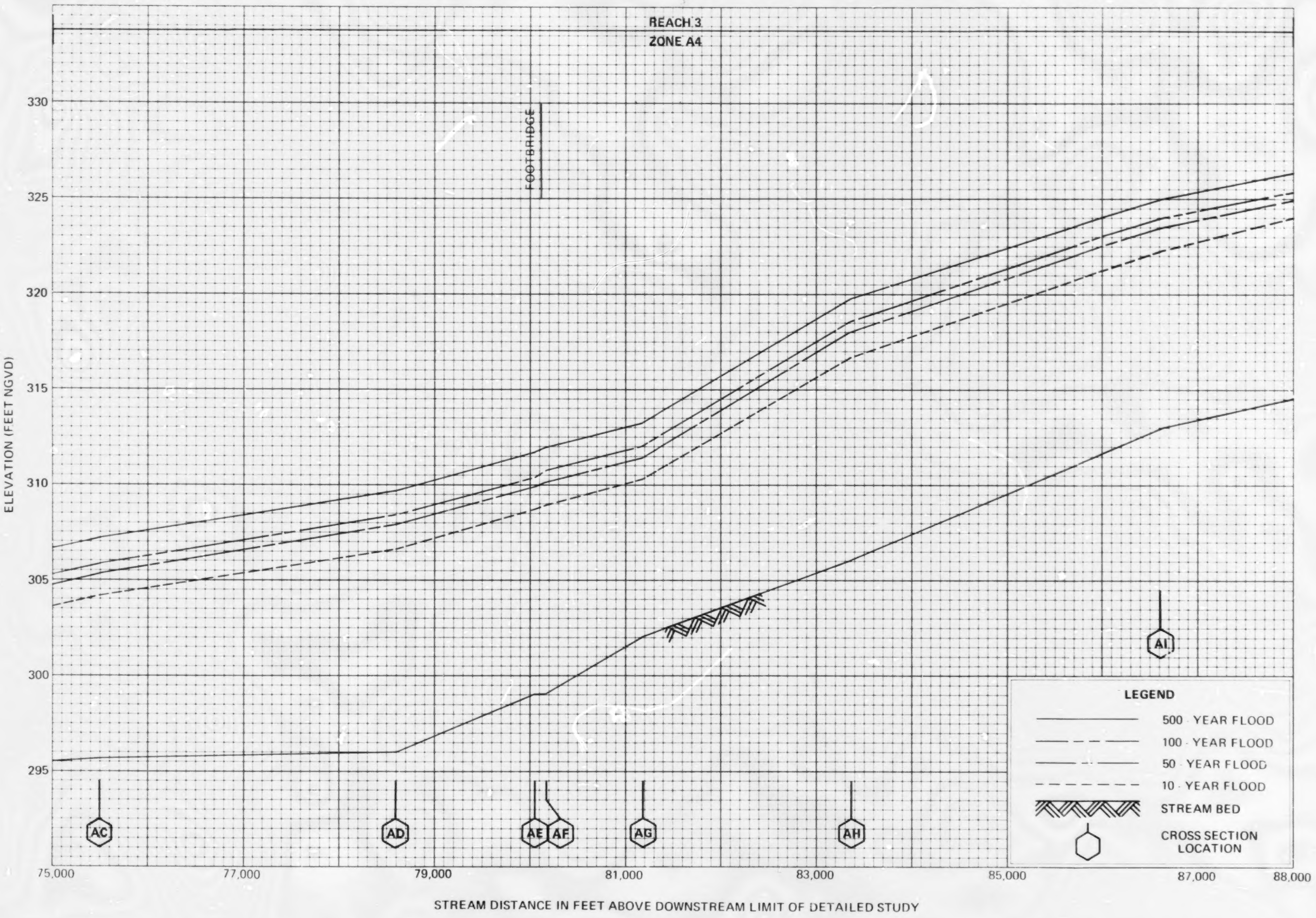


## FLOOD PROFILES

LITTLE SUSITNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

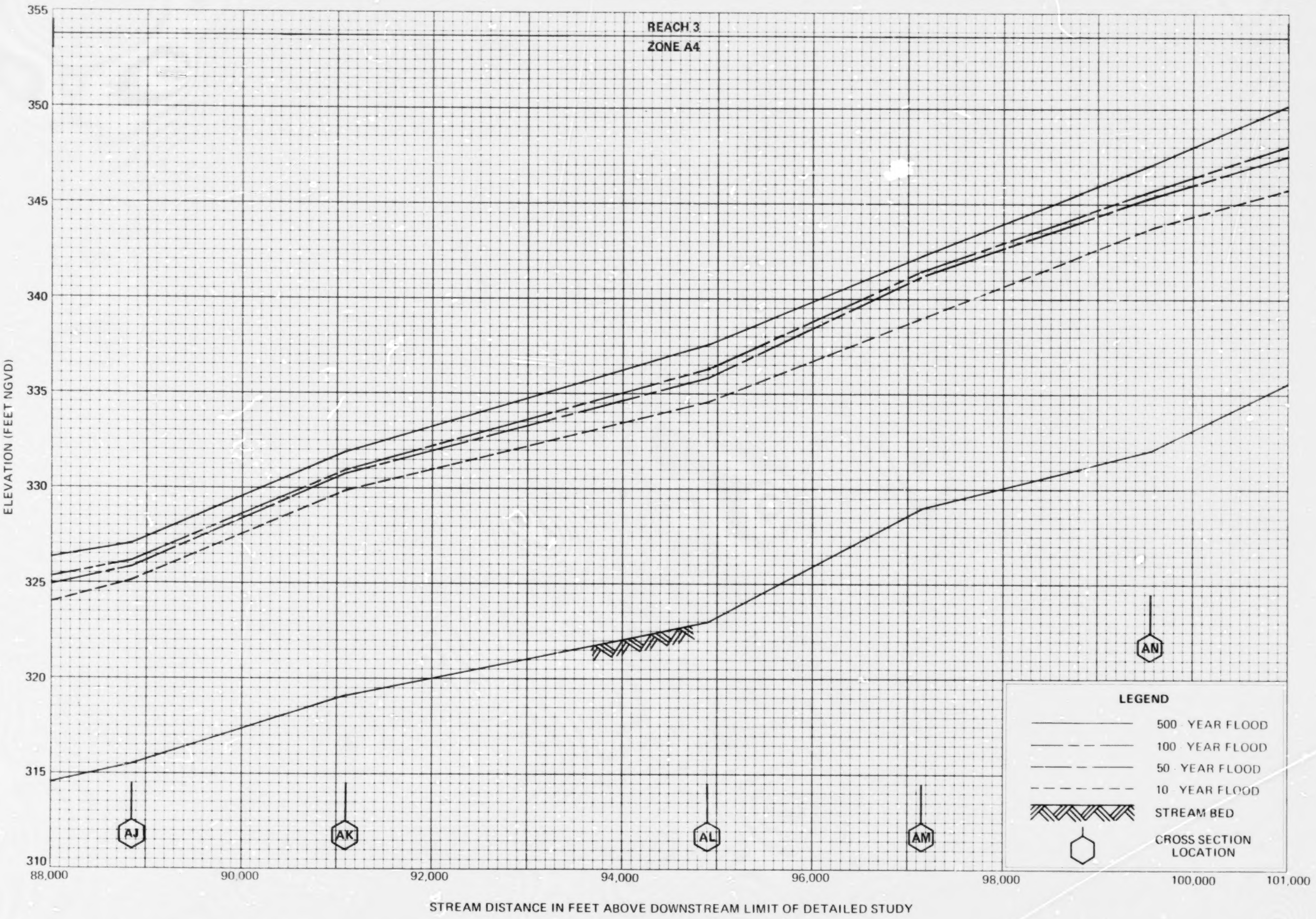


**FLOOD PROFILES**

LITTLE SUSITNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)



## FLOOD PROFILES

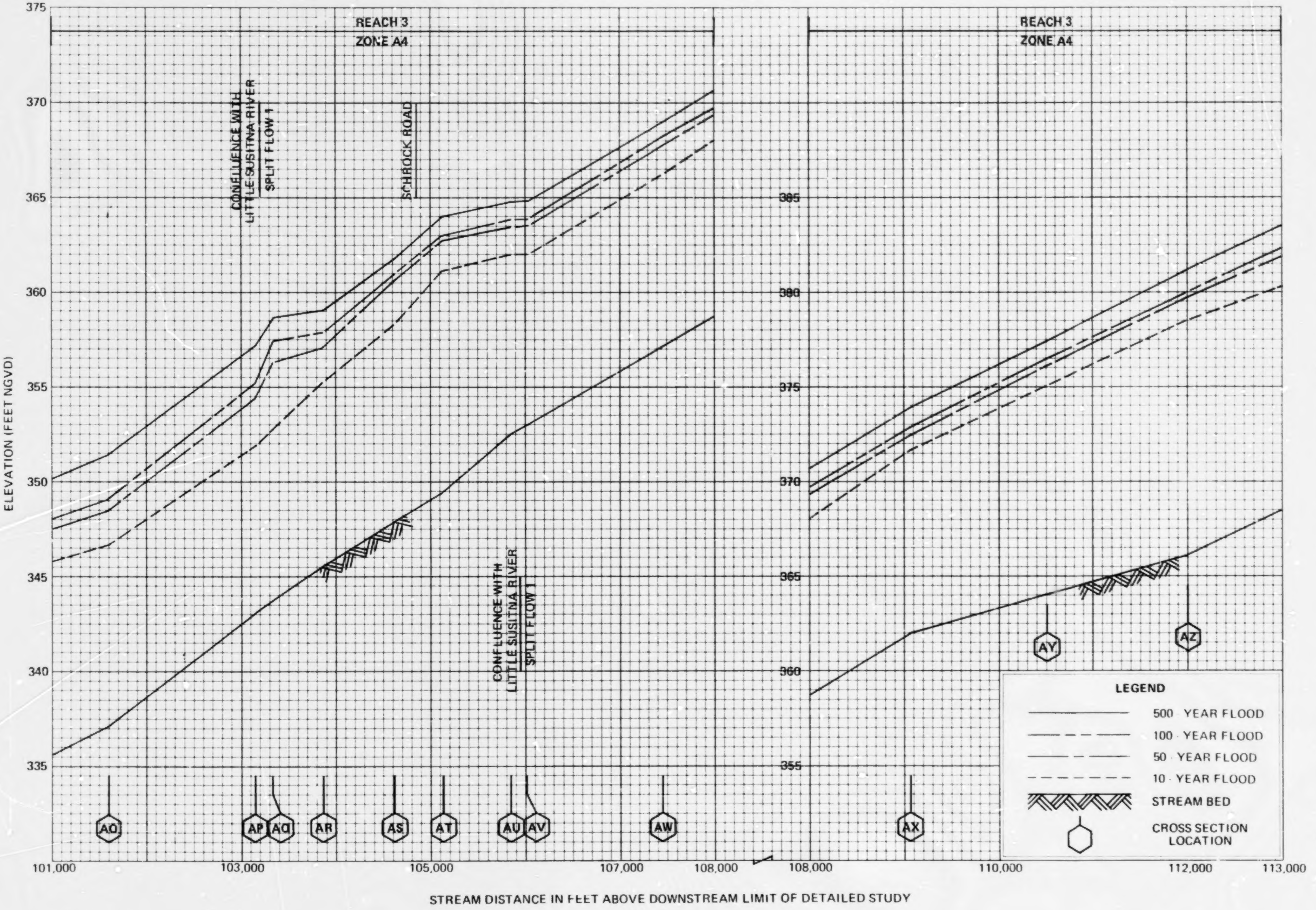
LITTLE SUSITNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

**29P**

64



**FLOOD PROFILES**

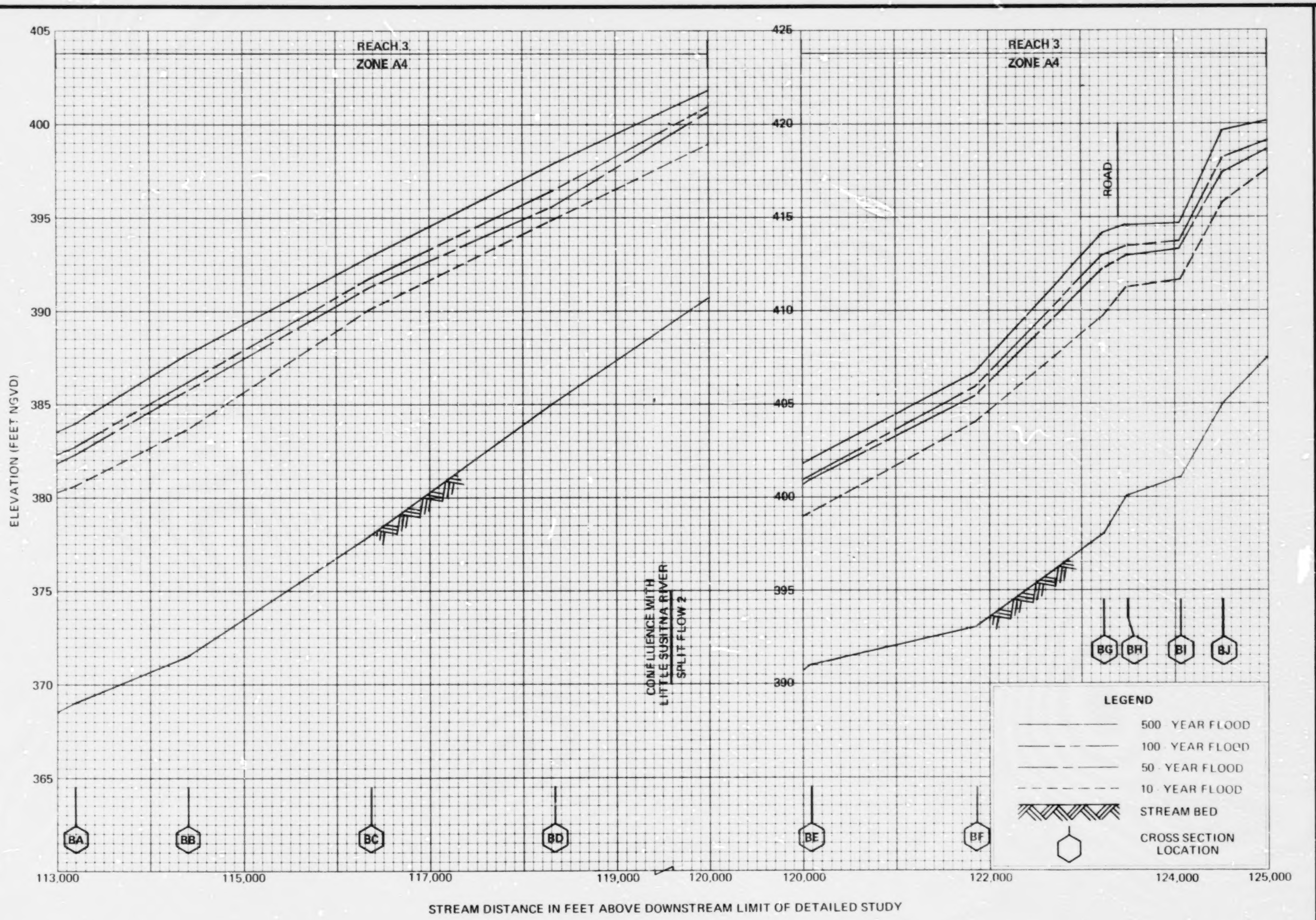
LITTLE SUSITNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

**30P**

65



**FLOOD PROFILES**

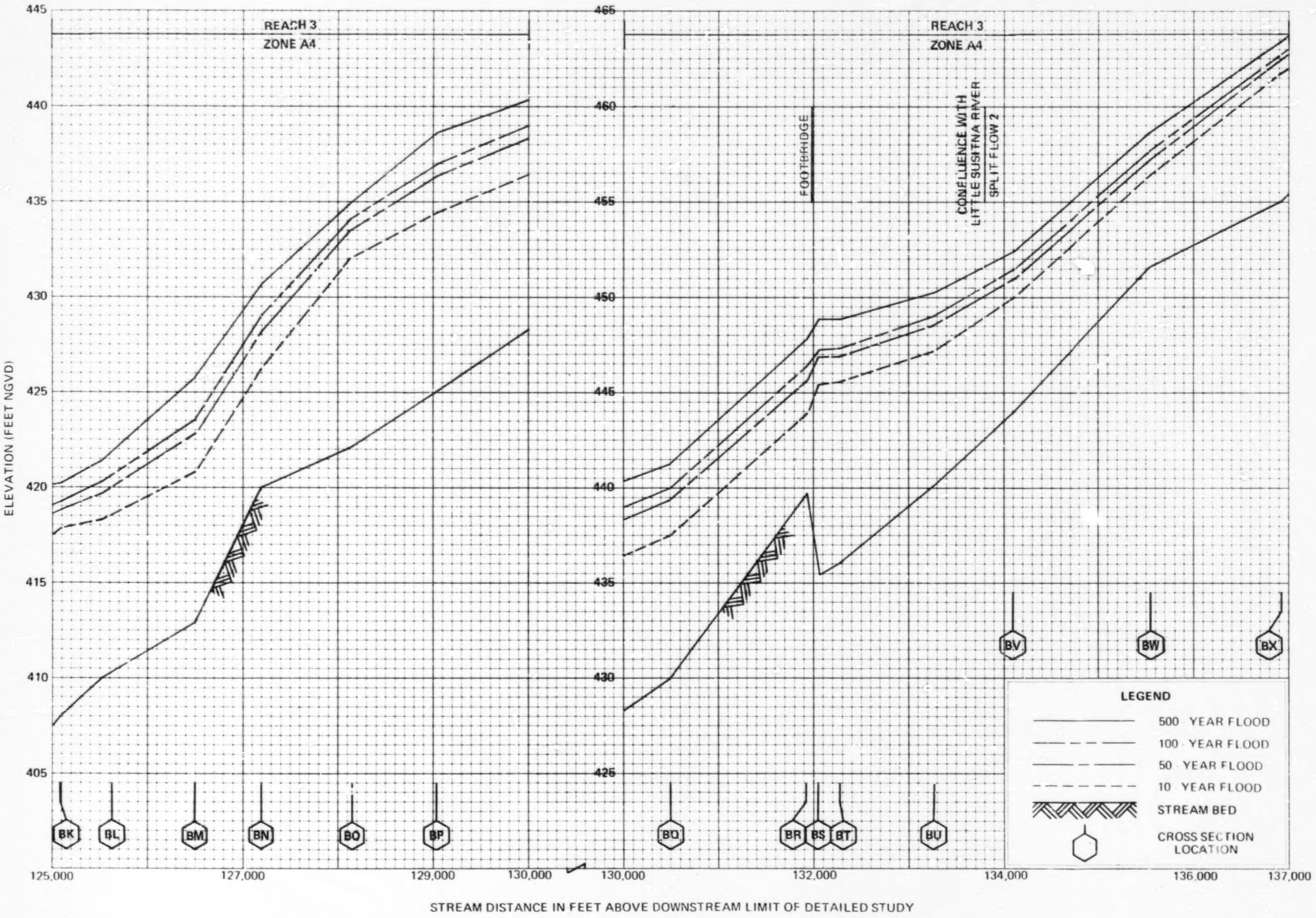
LITTLE SUSITNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

**31P**

66



# FLOOD PROFILES

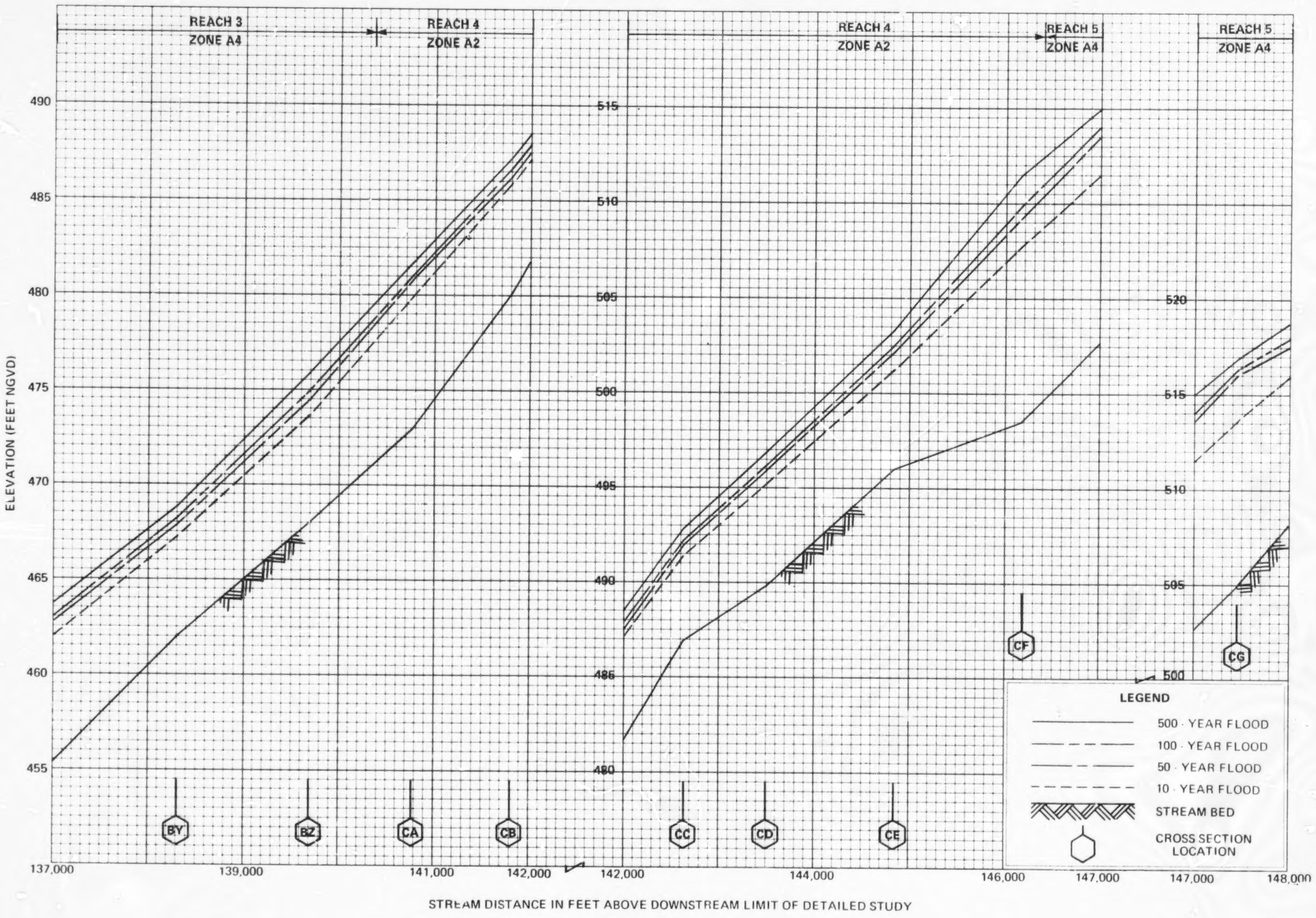
LITTLE SUSITNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

**32P**

67



## FLOOD PROFILES

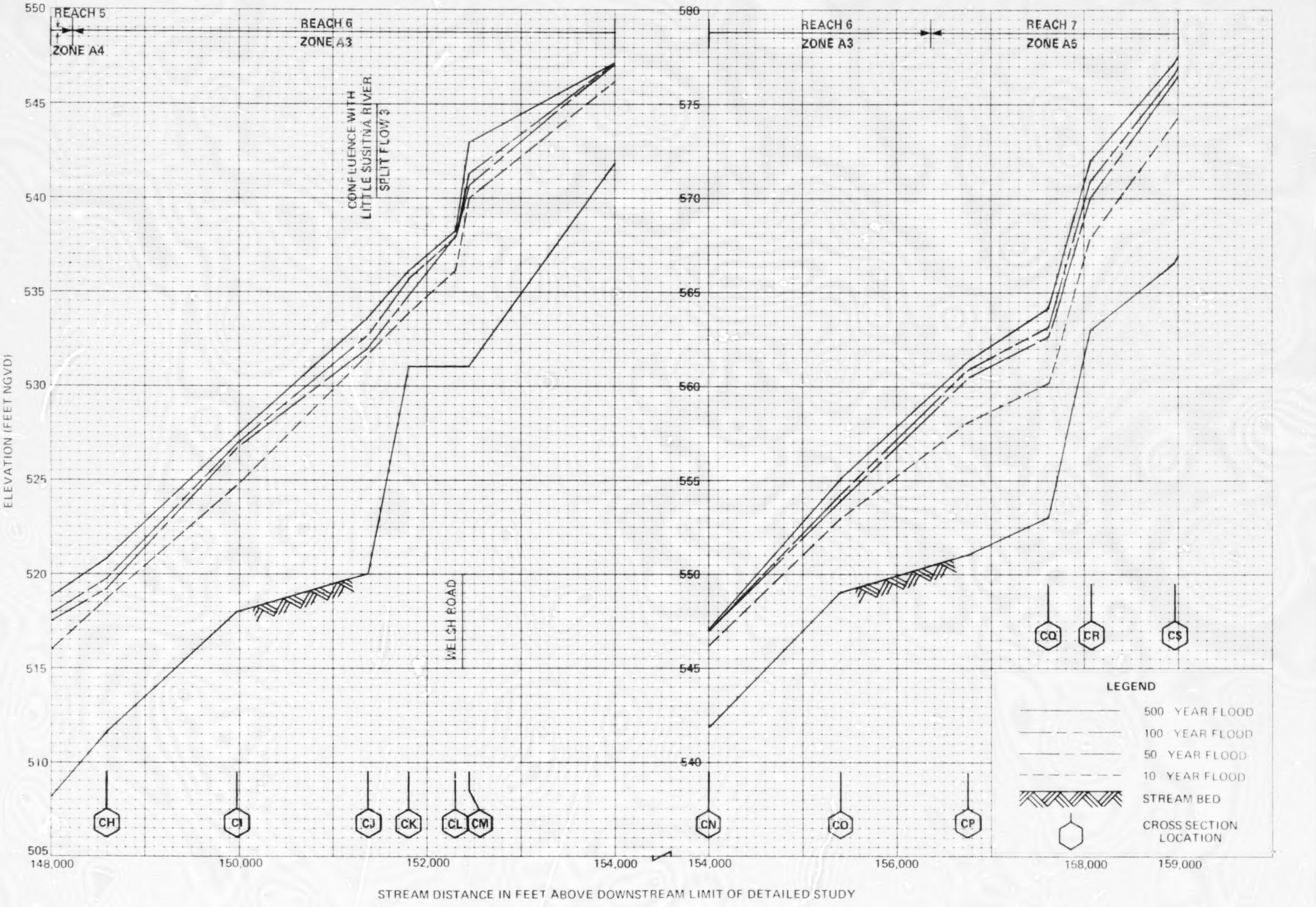
LITTLE SUSITNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

**33P**

68



# FLOOD PROFILES

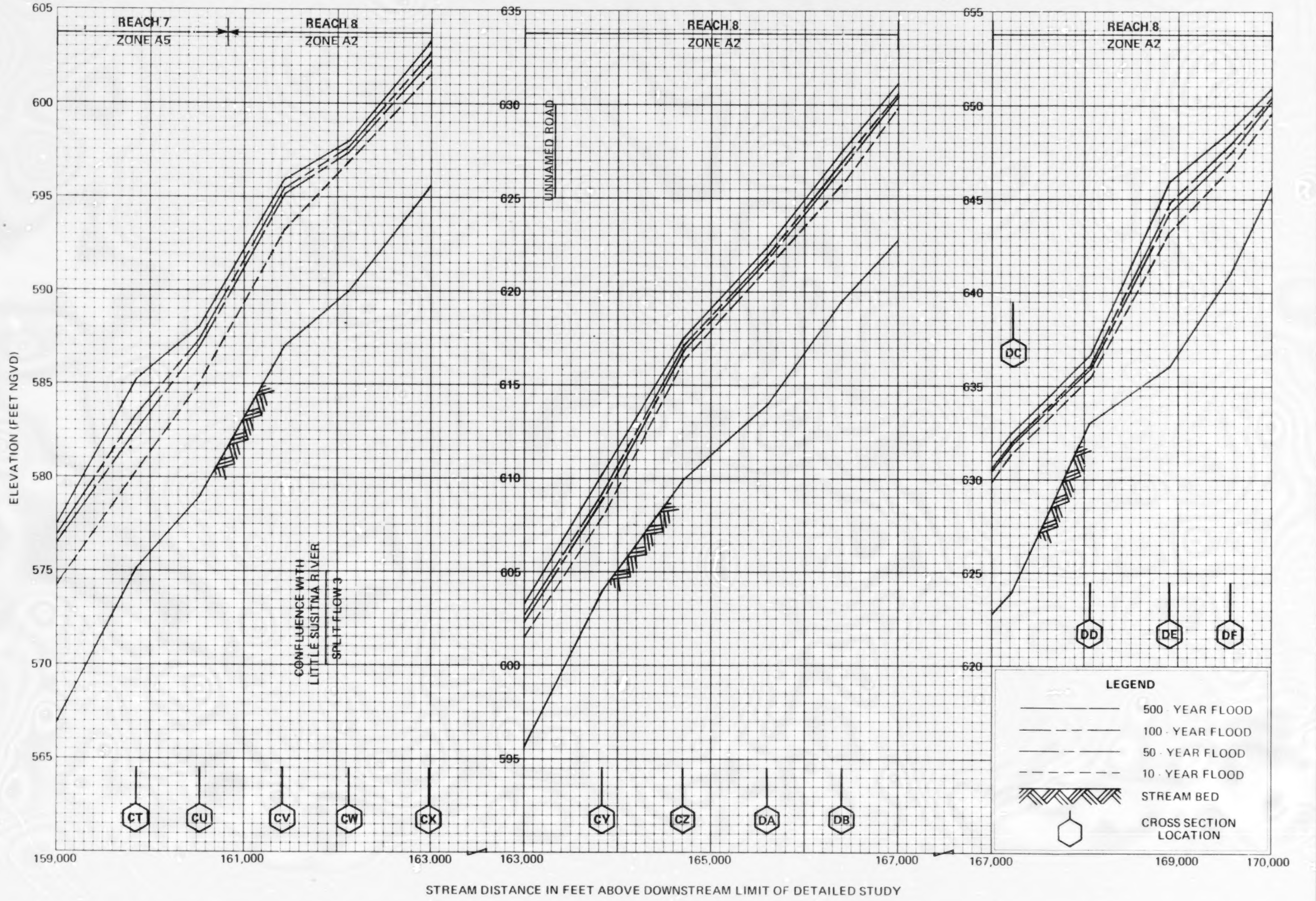
LITTLE SUSITNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

**MATANUSKA-SUSITNA BOROUGH, AK**
(MATANUSKA-SUSITNA DIVISION)

**34P**

69



# FLOOD PROFILES

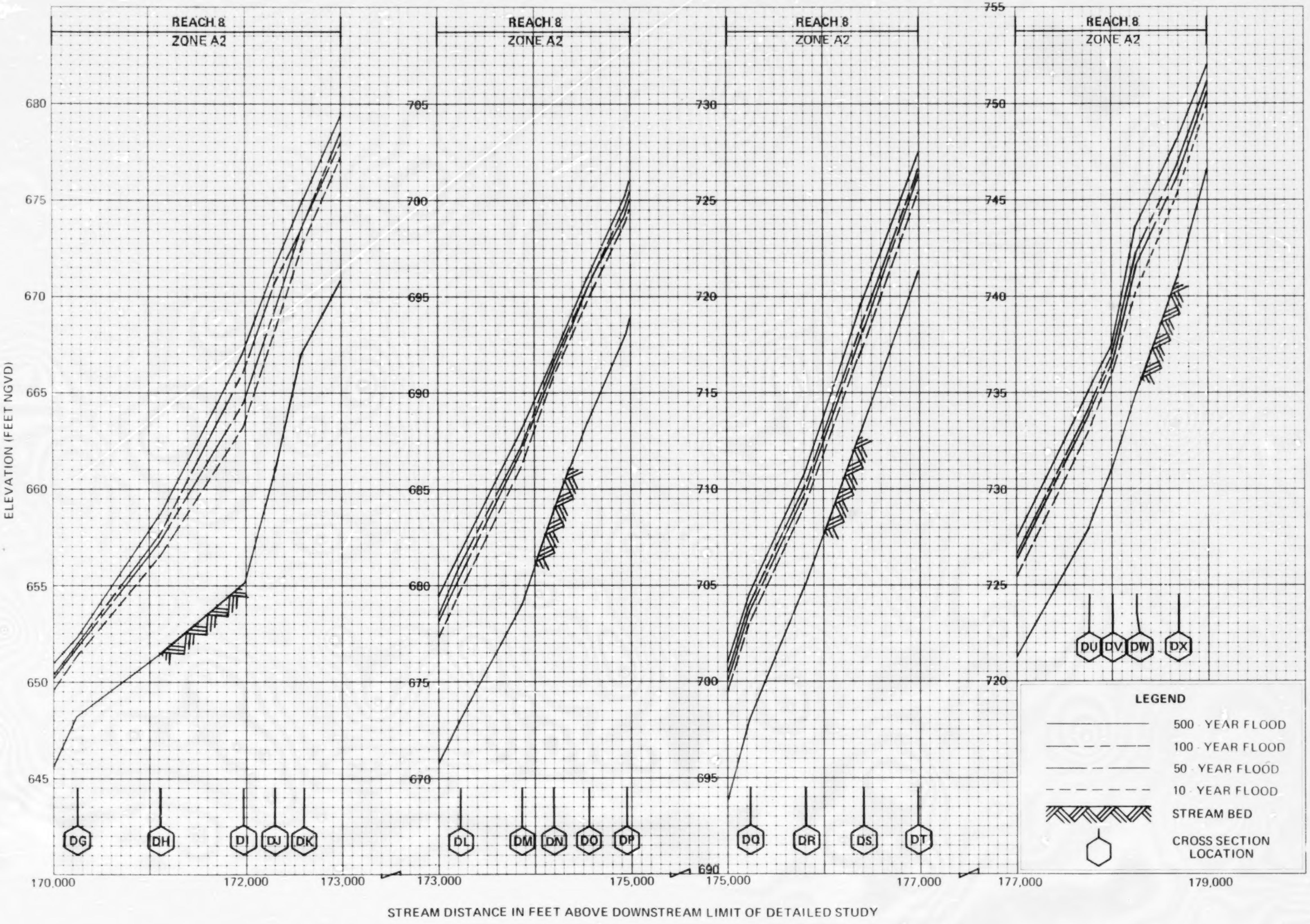
LITTLE SUSITNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

35P

70



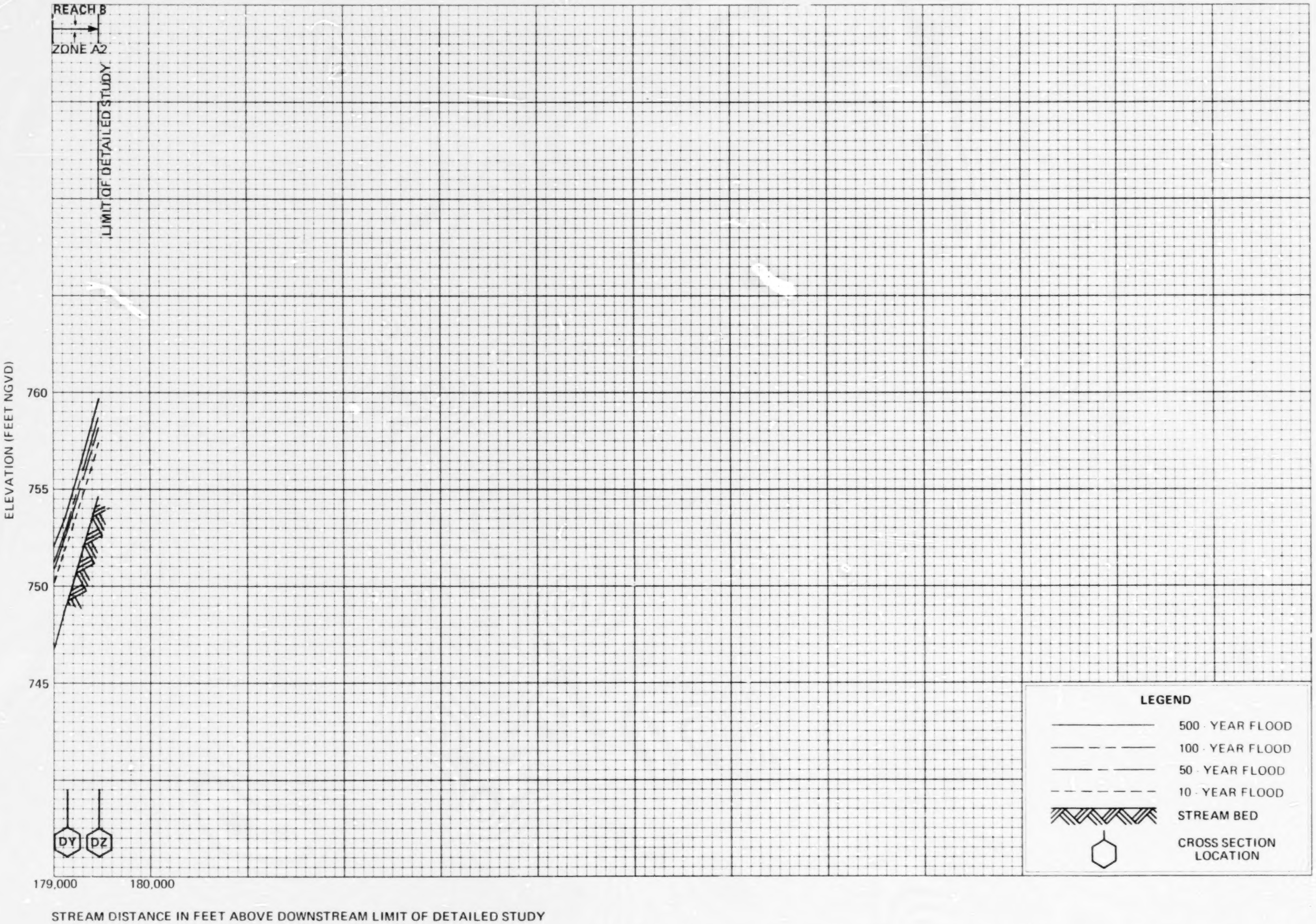
## FLOOD PROFILES

LITTLE SUSITNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

36P



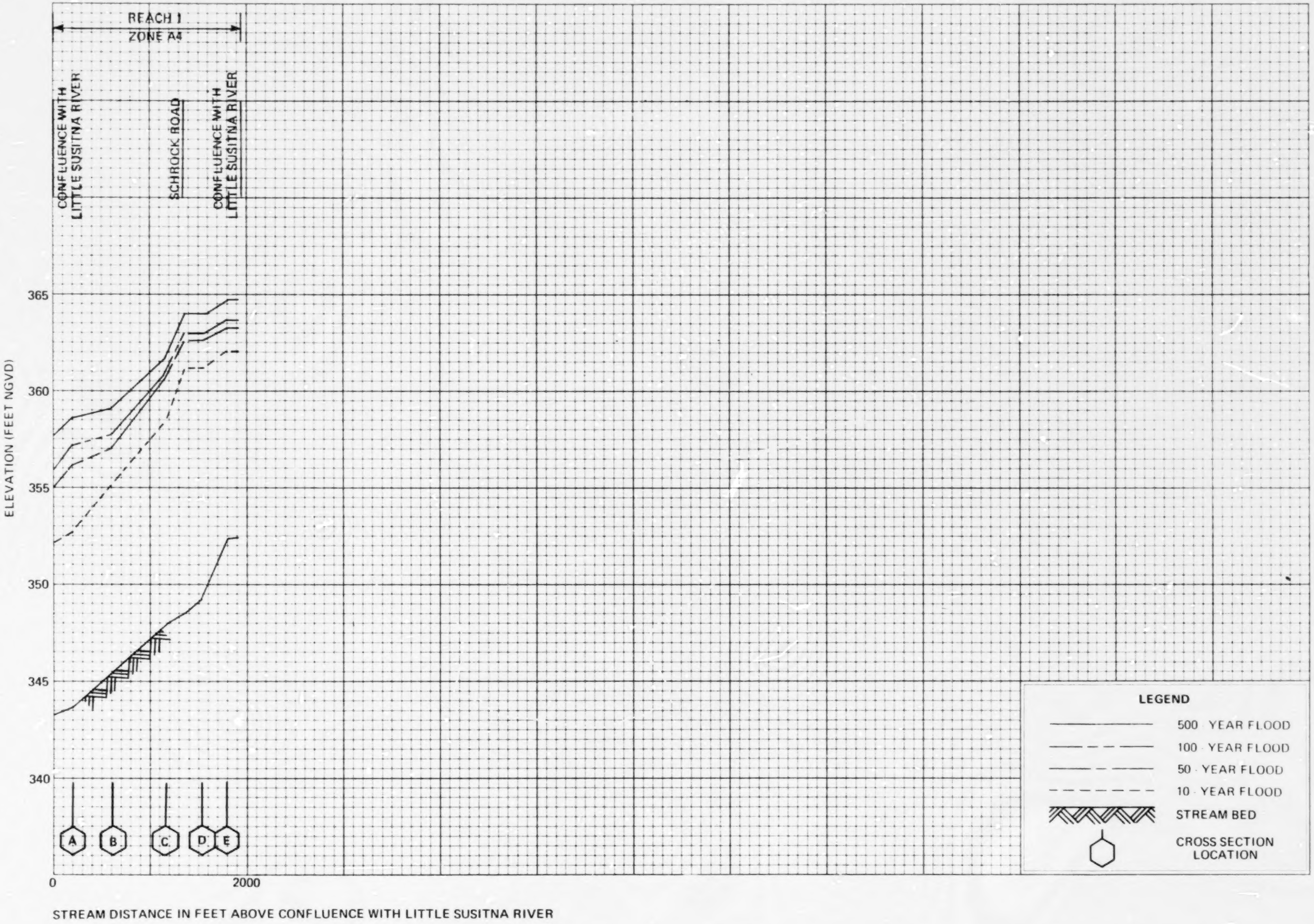
**FLOOD PROFILES**

LITTLE SUSITNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

**MATANUSKA-SUSITNA BOROUGH, AK**
(MATANUSKA-SUSITNA DIVISION)

**37P**



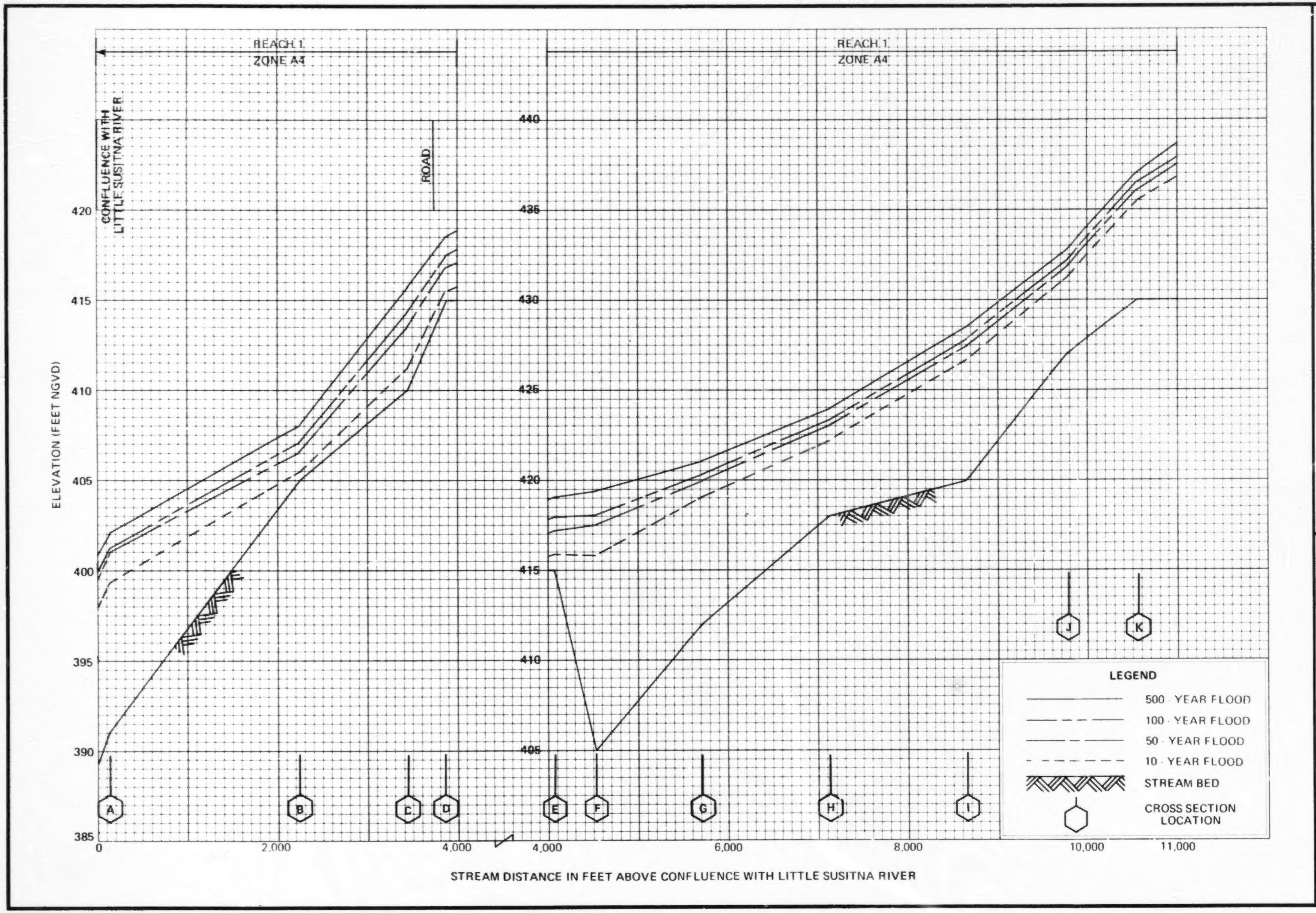
**FLOOD PROFILES**

LITTLE SUSITNA RIVER SPLIT FLOW 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

**38P**



# FLOOD PROFILES

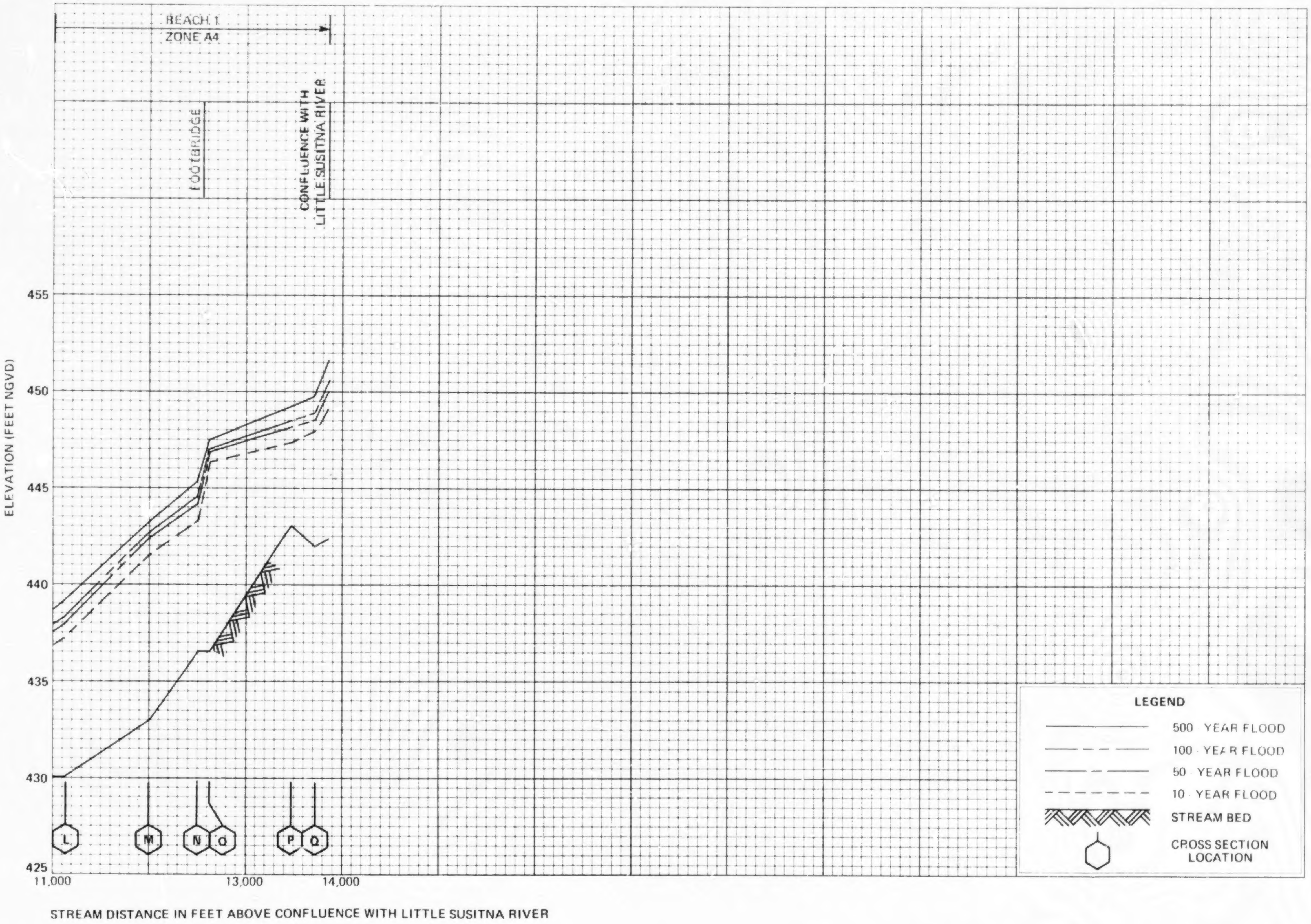
LITTLE SUSITNA RIVER SPLIT FLOW 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

39P

74



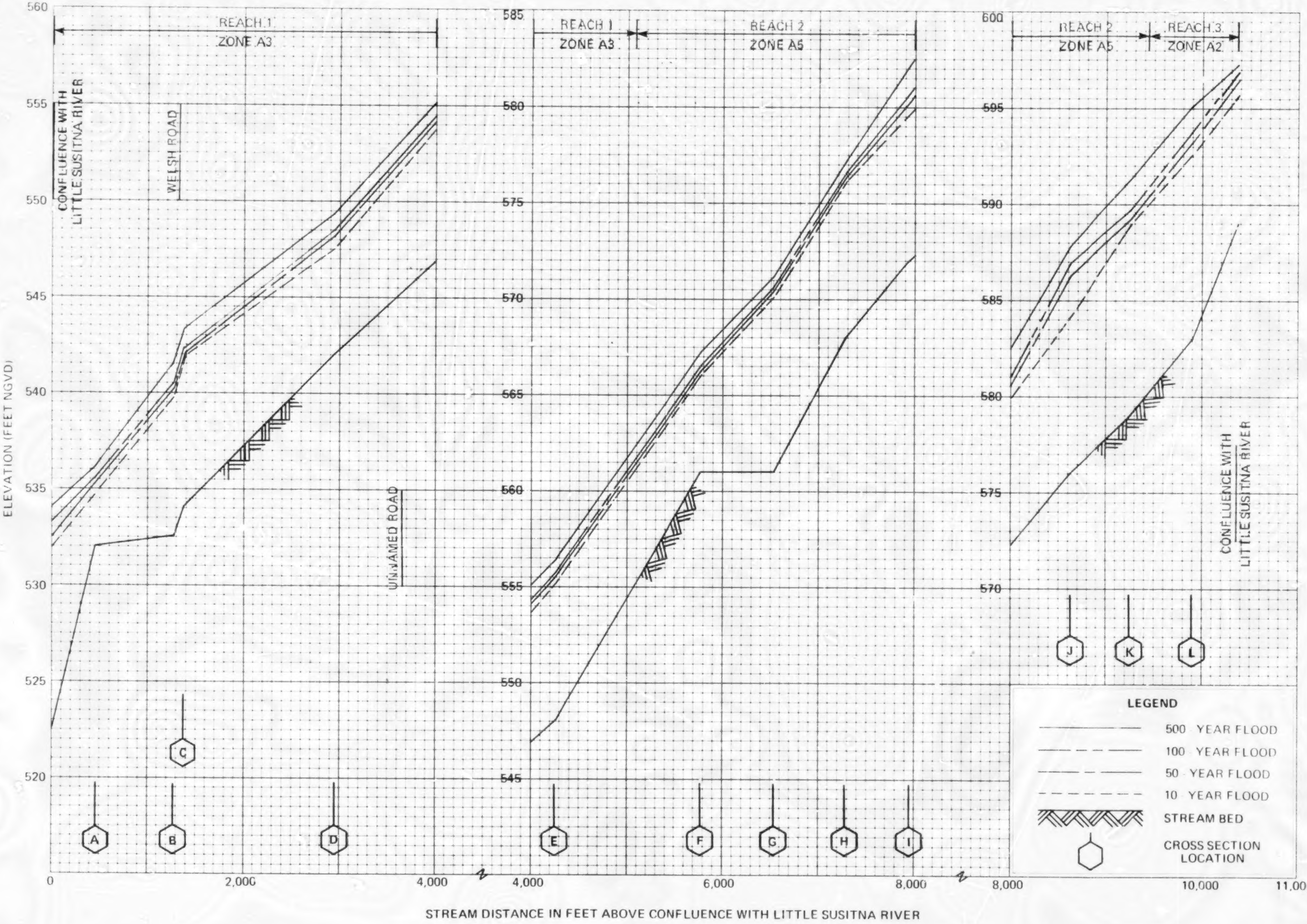
# FLOOD PROFILES

## LITTLE SUSITNA RIVER SPLIT FLOW 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

**40P**



# FLOOD PROFILES

LITTLE SUSITNA RIVER SPLIT FLOW 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK
(MATANUSKA-SUSITNA DIVISION)

41P

76